ENGINEERING NEWS-RECORD

JULY 5, 1956

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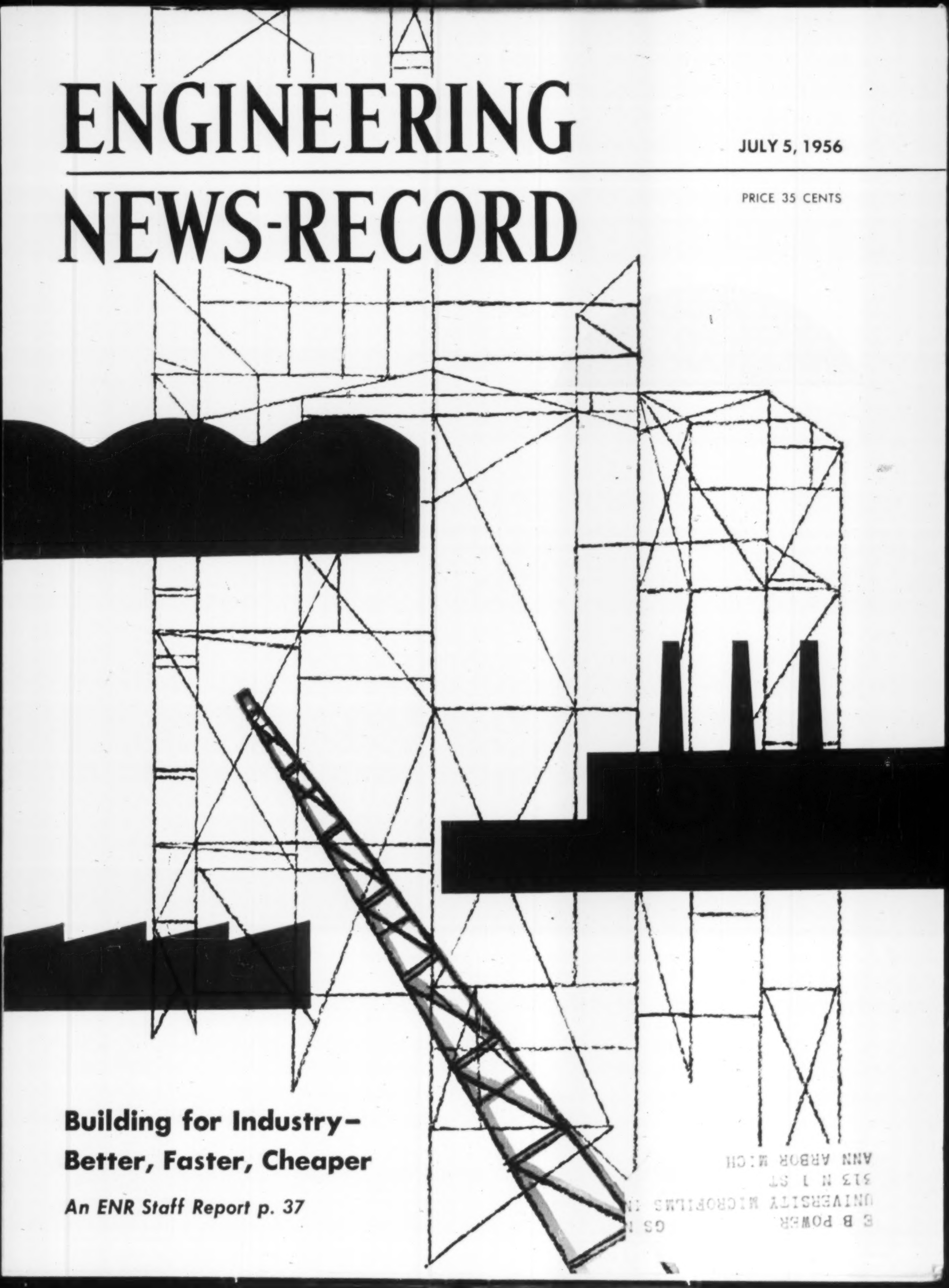
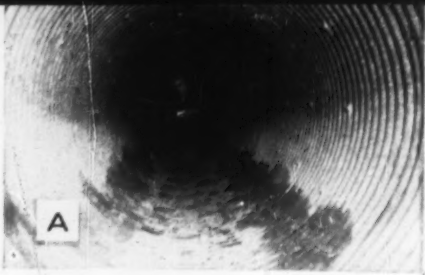


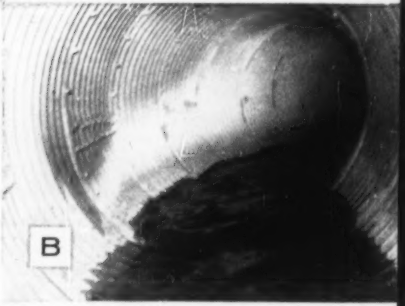
Building for Industry— Better, Faster, Cheaper

An ENR Staff Report p. 37



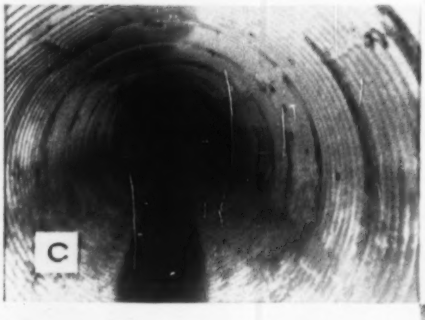
LEFT: This 36-inch-diameter Armco Sewer was recently inspected in a mountain city.

WHICH ARMCO SEWER HAS BEEN INSTALLED 49 Years?



ABOVE: Large diameter Armco Sewer installed in a midwest city.

Hard to tell, isn't it?



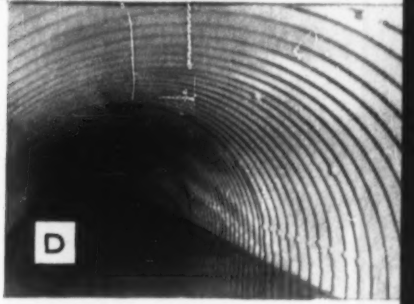
LEFT: This Armco Storm Sewer in a midwest city is of 14-gage, 36 inches in diameter.

Actually, you can't tell the age of an Armco Sewer just by looking at it. Armco Corrugated Metal Sewer Structures have an outstanding record for long, economical and efficient service.

But in case you are wondering, Armco Sewer (A) has been in service 39½ years; sewer (B), 26 years; sewer (C), 49 years; and sewer (D), 28 years. How close did you guess?

Long life is not the only advantage of Armco Sewer Structures. Corrugated metal design provides ample strength for any loading condition. Long lengths speed up installation. Sturdy coupling bands assure tight joints and a continuous conduit. Choice of protective coatings and pavements solves corrosion and erosion problems. Wide size range meets capacity requirements. And unskilled labor can handle the job, saving money at every step.

Write now for complete data on your specific needs. Armco Drainage & Metal Products, Inc., 5456 Curtis Street, Middletown, Ohio. Subsidiary of Armco Steel Corporation. In Canada: write Guelph, Ontario. Export: The Armco International Corporation.



ABOVE: A large southern city installed this 30-inch-diameter Armco Sewer Structure.

Armco Sewer Structures

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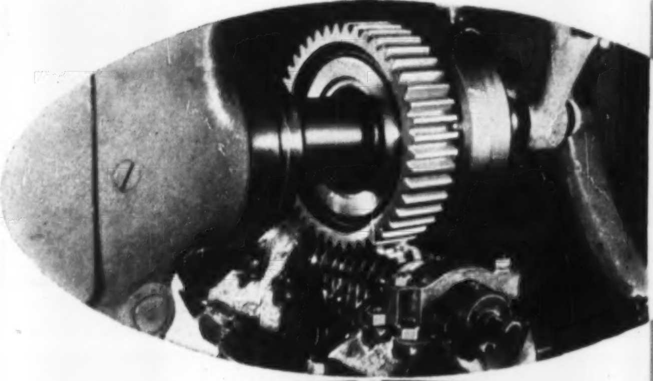

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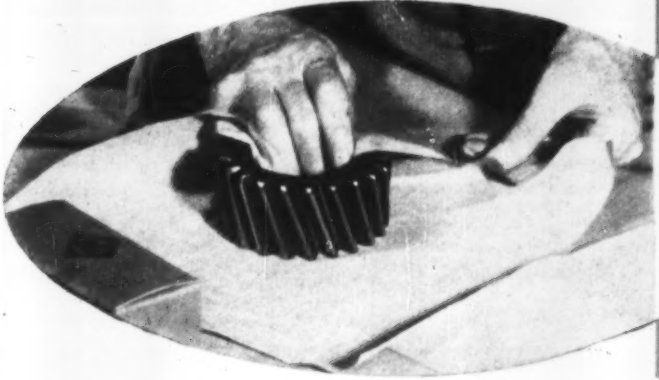

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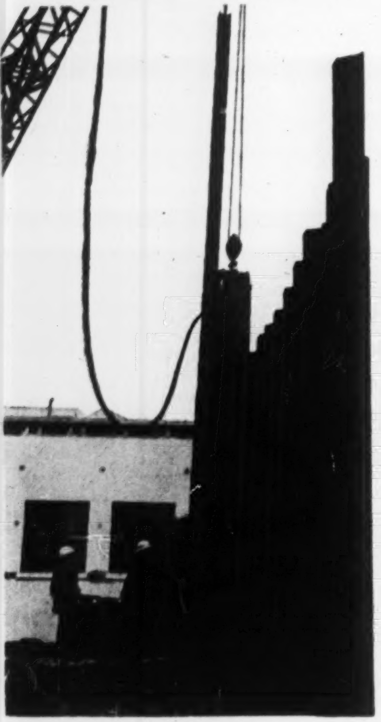
At 3 P.M....

CAVE-IN!



Cave-ins will happen, through no fault of the contractor. On this excavation job, there was erratic soil behavior, shifting loads, saturating rain . . . everything unpredictable.

When it happened, L. B. Foster Co. was called at 3 P.M. for rental steel-sheet piling *in a rush*. We cut MP-116 piling in our yard, and delivered it in Foster trucks to the job site 400 miles away before the crews started work next morning.

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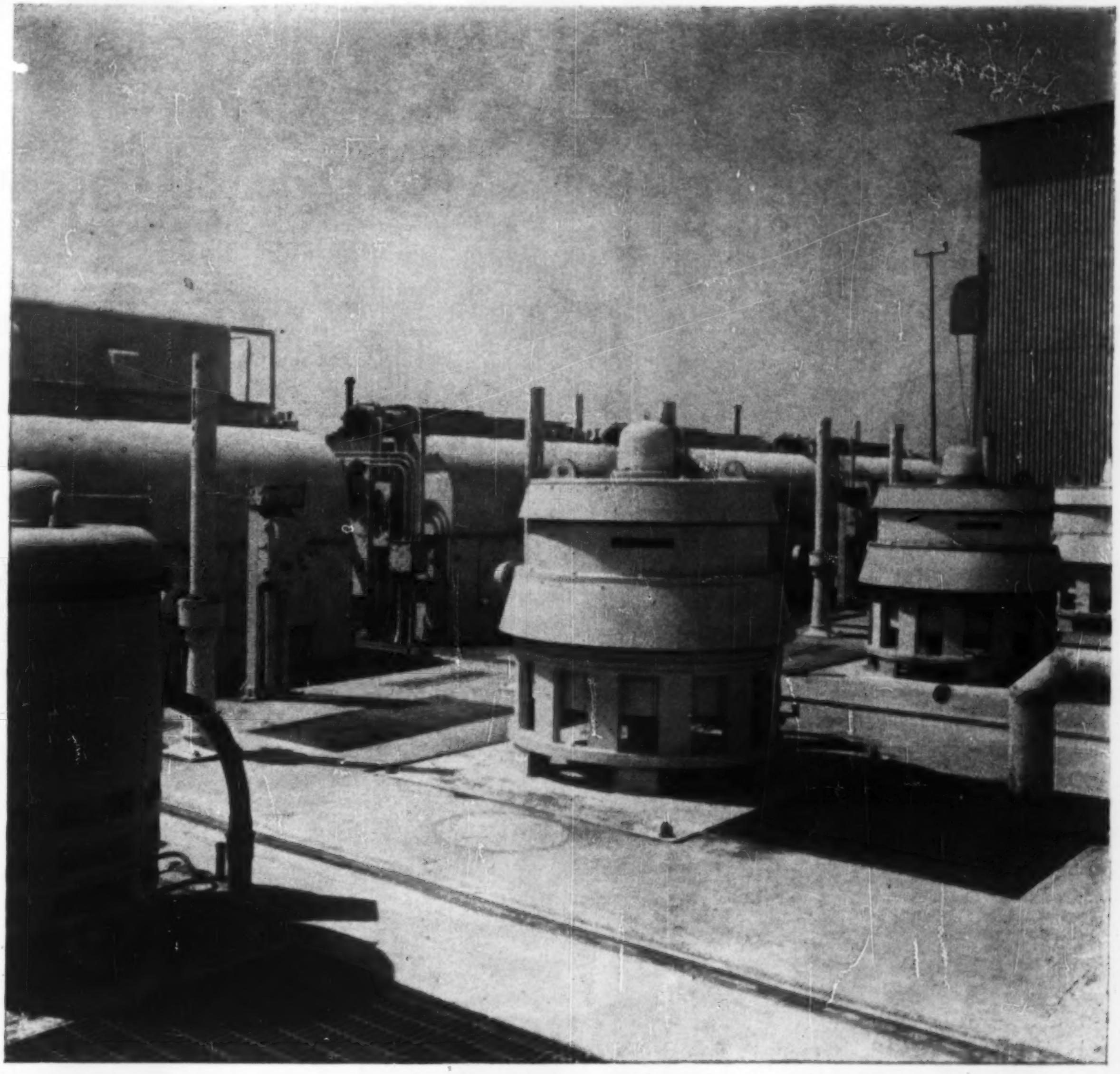

Four Fairbanks-Morse low-lift propeller pumps at Fairless

Delaware Borrow

Every day the Fairless Works takes 230 million gallons of water from the Delaware River, uses it in the production of iron and steel, and after treatment returns it to the river. The "big borrow" is started in a plant pumping station equipped with ten Fairbanks-Morse propeller and turbine pumps in efficiently chosen sizes up to 48 inches.

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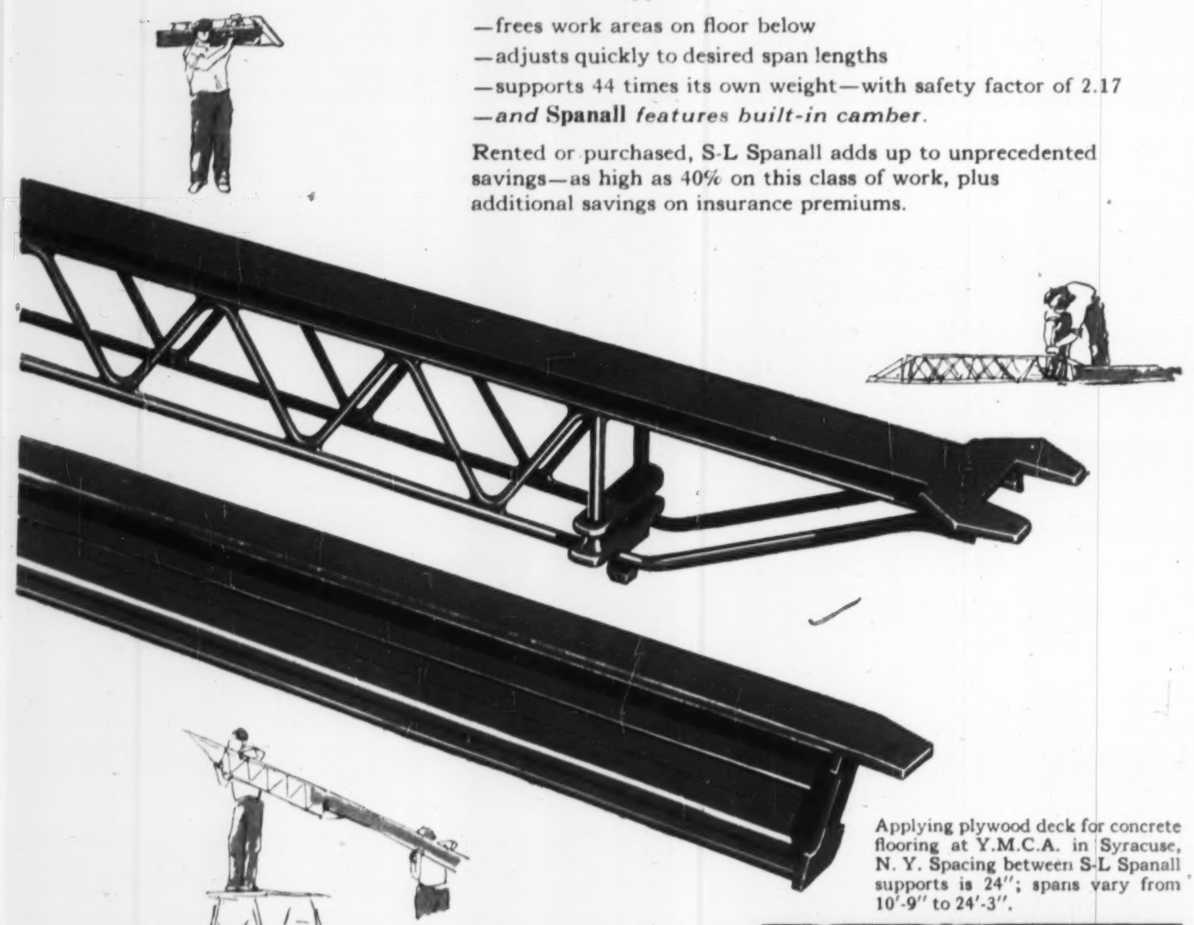

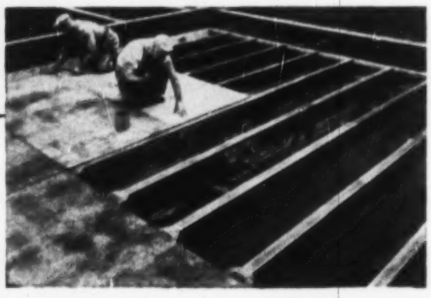

Applying plywood deck for concrete flooring at Y.M.C.A. in Syracuse, N. Y. Spacing between S-L Spanall supports is 24″; spans vary from 10′-9″ to 24′-3″.

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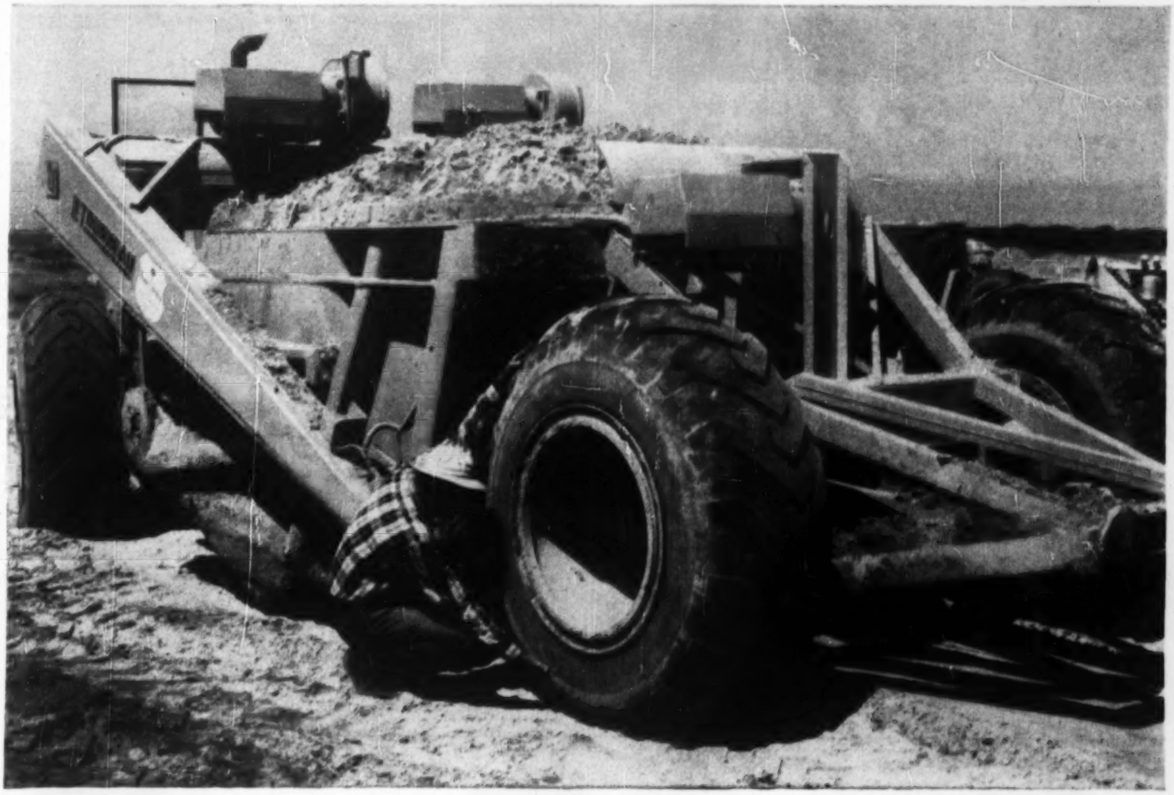

Sandy soil and 24-ton loads—here's a job for new BFG Special Earth Mover tires

THAT giant scraper is hauling 24 tons of sand fill for troop barracks at Fort Ord, California. Plowing through sandy soil under this payload, plus the weight of the equipment, would cause most tires to bog down and become useless. That's why this contractor uses these giant B. F. Goodrich 65″ Special Earth Mover tires with *all-nylon* cord construction.

Special Earth Mover tires operate at low air pressures. They conform to the soil, rolling over it rather than digging into it. And to stand the strain of this flexing, B. F. Goodrich builds the Special Earth Mover tire with an *all-nylon* cord body.

Nylon withstands double the impact of ordinary cord materials, resists heat blowouts and flex breaks. That's why B. F. Goodrich builds *all* of its off-the-road tires with an *all-nylon* body, why they can be recapped over and over!

Your B. F. Goodrich retailer has a longer-wearing, money-saving tire for every type of off-the-road work. See him today or write *B. F. Goodrich Tire & Equipment Co., A Division of The B. F. Goodrich Co., Akron 18, Ohio.*

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Specify B. F. Goodrich tires when ordering new equipment

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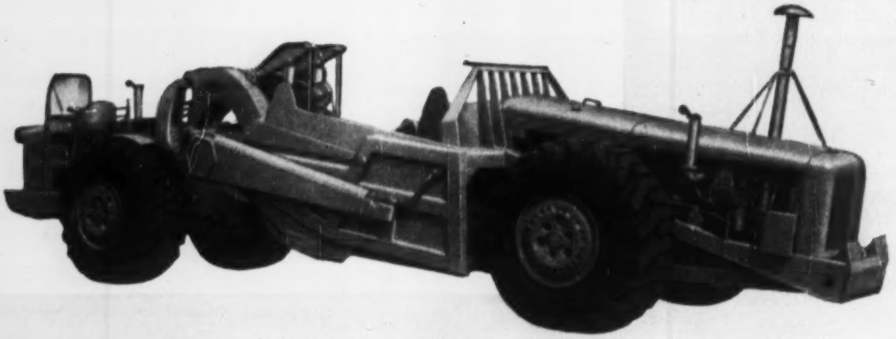
Small job or Big project..

On this Florida Turnpike contract of Blythe Bros., two TS-18 "Eucs" loaded, hauled and dumped in sandy conditions that "hung up" other equipment. The tremendous power and traction of this Euclid scraper, and its easy operation, made the "Twin" a logical choice for this tough job.

Western Contracting Corp. owns 15 of these TS-18 Euclid Scrapers . . . they used 12 of them on a 7 million yard Indiana Turnpike contract and now have 10 of their "Twins" at work on Oahe Dam in South Dakota. Western's scrapers are equipped with top extensions that add 6½ yds. to the bowl capacity . . . have a total of 518 h.p.—a 300 h.p. engine in the tractor and 218 h.p. for the scraper wheels.

EUCLID TWIN-POWER
in the TS-18
provides more work-ability than you get in any other scraper

Twin-Power—the use of two engines driving separate axles—was pioneered in the earth moving field by Euclid 10 years ago. Torque converters and semi-automatic transmissions assure easy operation and a smooth flow of power matched to all job conditions. One of Euclid's newest scraper models, the TS-18 uses power and drive components that have proved their dependable performance in other "Eucs" on hundreds of jobs.

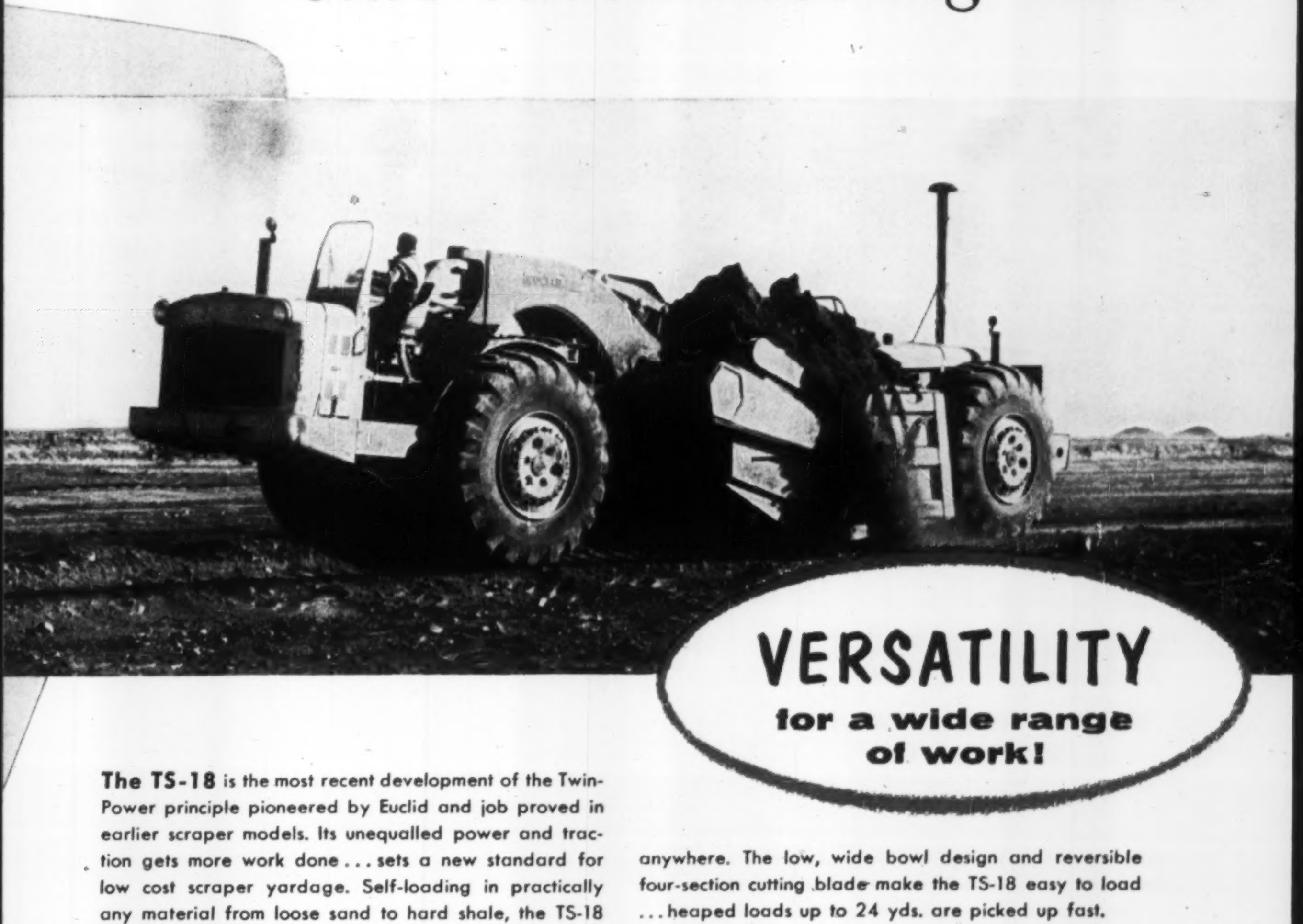


The TS-18 is powered by two 218 h.p. engines—one in the tractor and another behind the scraper bowl. For work where even more power can be used, a 300 h.p. engine for the tractor is available. Both engines drive through separate Torqmatic Drives. Standard tires are 27.00 x 33 with 33.50 x 33 available as optional equipment.

Harris Construction Co. recently set a new record for earth moving on Montana highway work with six TS-18 "Eucs". . . moved 90,000 yds. in a single week, working 10 hours a day. The scrapers self-loaded and hauled an average of 2,000 ft. This contractor is also using his "Twins" for grading and construction of runways at nearby Glasgow Air Base.

EUCLID DIVISION
GENERAL MOTORS CORPORATION
Cleveland 17, Ohio

this TS-18 "Euc" cuts earth moving costs!



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for a wide range of work!

The TS-18 is the most recent development of the Twin-Power principle pioneered by Euclid and job proved in earlier scraper models. Its unequalled power and traction gets more work done . . . sets a new standard for low cost scraper yardage. Self-loading in practically any material from loose sand to hard shale, the TS-18 is a one-man earthmoving spread. It works on steep grades and under job conditions that stymie other self-powered scraper equipment.

Hydraulic lever action does away with cable headaches and expense. All scraper operations—bowl, apron and ejector—are independently controlled. All four of the hydraulic jacks are interchangeable . . . one spare fits anywhere. The low, wide bowl design and reversible four-section cutting blade make the TS-18 easy to load . . . heaped loads up to 24 yds. are picked up fast.

Like all other Euclid Scrapers, the TS-18 is built to stay on the job with less down-time for servicing and repair. All major components are readily accessible . . . a feature that really pays off in more work-ability and lower maintenance cost. Your Euclid dealer has facts and figures showing why owners everywhere say that ***Euclids are your best investment.***

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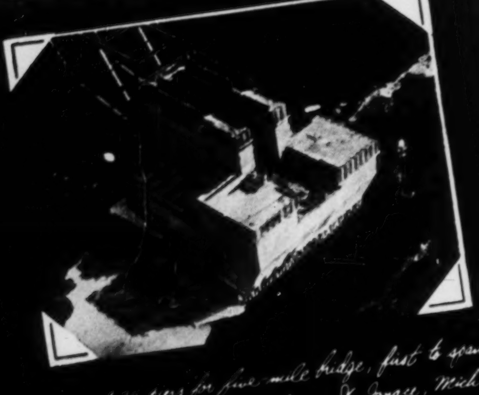
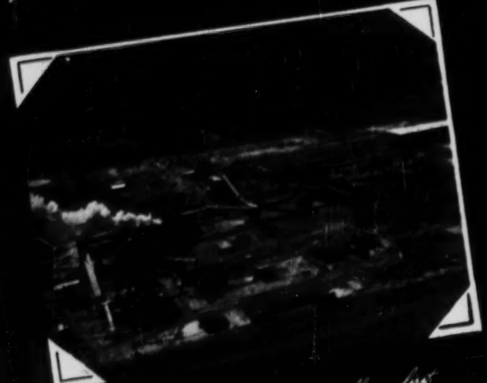


One of 34 piers for five mile bridge, first to span "impossible" Straits of Mackinac, St. Ignace, Mich.



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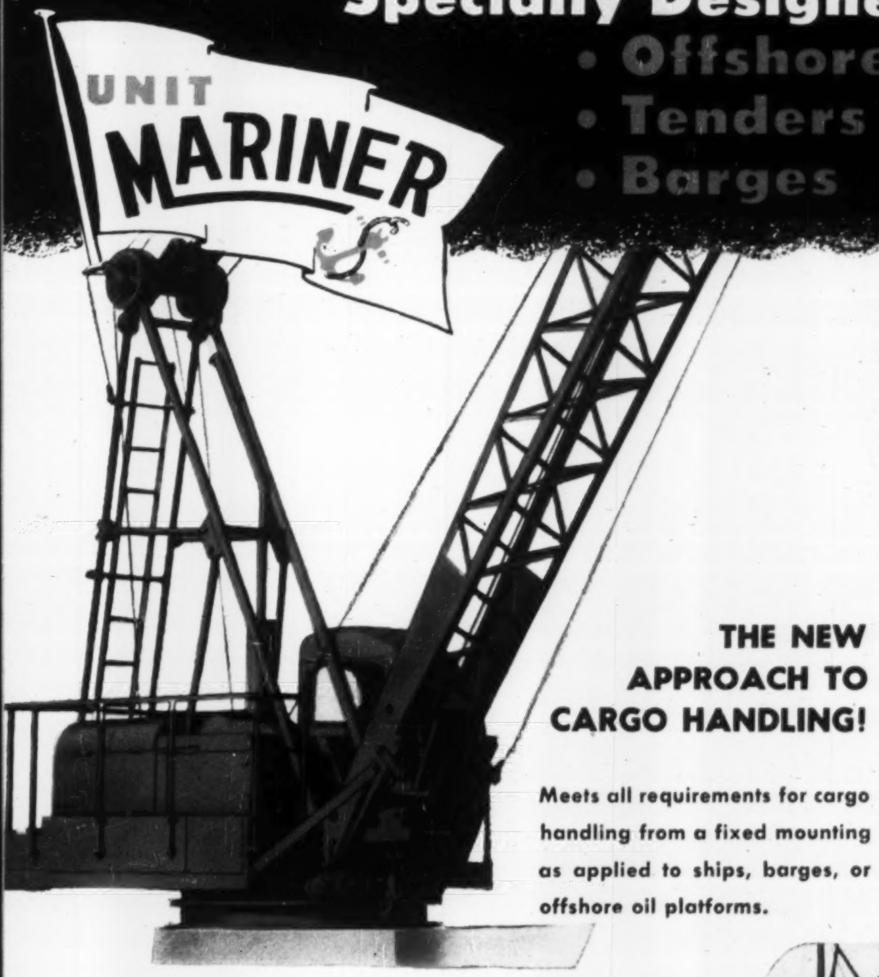

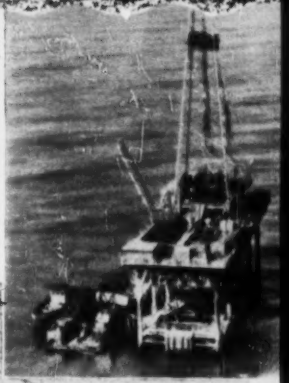

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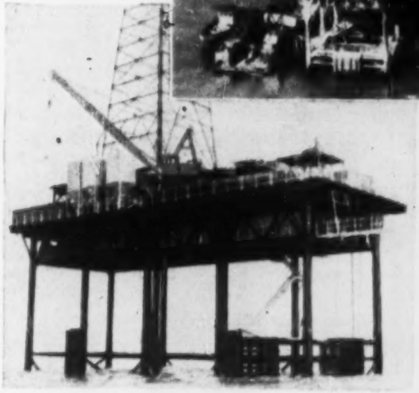

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Reader Comment

From Karl Imhoff

SIR—You were very kind in printing your salute to me concerning my 80th birthday in the April 5 number of your journal. Thank you very much.

I remember the time, when the two journals "News" and "Record" were separate, and Mr. M. N. Baker was an editor of Engineering News.

KARL IMHOFF
Essen, Germany

Damodar Progress in India

SIR—The "Progress Report on India's TVA" (ENR Apr. 12, p. 53) is most informative and gives a clear and concise picture of the projects executed by the Damodar Valley Corporation in its first phase program.

There is one point, however, which should be amplified. The article states that the overall program of the DVC is five years behind schedule. Actually it is only 18 months behind the firm construction schedule which was drafted in late 1951. The five-year delay presumably refers to the original schedule which was made early in 1945 and which at best was very preliminary.

A. M. KOMORA
Chief Engineer
Damodar Valley Corp.
Manbhum, Bihar, India

Balky Architects Not Striking

SIR—John E. Taft's letter (ENR May 31, p. 8) on the refusal of the Delaware architects to sign design contracts carrying only a 5% fee indicates an apparent lack of understanding of the problem.

The statements that this is a "lock-out" and a "strike," that "labor relations parlance" can be brought to bear and that the architects are self-employed and employed also are all products of muddy thinking and wilful turning of the phraseology to the advantage of the writer.

1. No work was stopped that had already been started because the design contracts entered into cannot be changed retroactively. This automatically means that the term "strike," which presupposes work in progress, is not applicable.

2. An architect is not "employed" under a contract; you do not "buy" design services any more than the designer "sells" his service. It is of course extremely convenient to use the terminology but when considering the type of service commissioned and being rendered, the differentiation is patently obvious. I doubt that even Mr. Taft would consider his doctor or his attorney as his "employees" and it is rather ungracious to consider their services as being "bought." The client-professional relationship, while difficult to define in words, is a delicate and very real thing of trust in actual life and refuses to be evaluated in terms of mere dollars.

3. The problem, of course, is nothing more than one of education; the legislature must be made to realize that not only is 5% too low but also that there is a legitimate level that is reasonably well established, and any fear of another round of wage increases with fringe benefits will hardly be forthcoming from the architects at the next session.

R. B. CUTLER
Boston, Mass.

Engineering News-Record welcomes expression of opinion from its readers. Comment should be as brief as possible and pertinent to subjects of current construction importance.

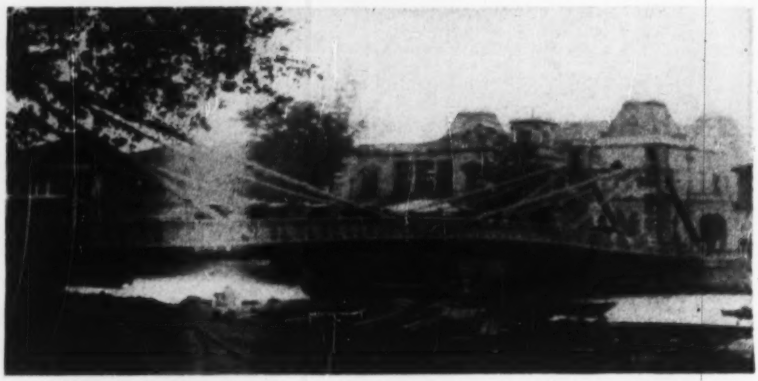
Letters should be addressed: Editor, Engineering News-Record, 330 W. 42nd St., New York 36, N. Y.

Revenues Corrected

SIR — Some misunderstanding has been created by what may have been a misprint on page 25 of Engineering News-Record for April 26, 1956. At the conclusion of the first paragraph in column 1, with reference to revenues on the Ohio turnpike, it is stated that "in April they were running at about $80,000." The actual figure for April revenues was closer to $30,000.

JAMES D. HARTSHORNE
Director of Information
and Research

Early Suspension Bridge



Singapore bridge, built 90 years ago, had stiffening trusses and inclined stays.

SIR—In your issue of May 24 there is an interesting historic review of the early Roebling suspension bridges (p. 27). The photo you print of the Wheeling Bridge is most interesting to me, as I am comparing it with the first suspension bridge built in the Far East, about 1865-1870 in Singapore.

That bridge was designed and built by my father, Arthur Hughes De Wind, who, in 1863, was appointed chief engineer of public works with headquarters at Singapore. I took the accompanying picture of the bridge in October, 1908. The difference in design as compared to the original Ellet bridge which failed at Wheeling might indicate that my father may have taken warning from this disaster.

While my father was a University of London engineer graduate and never visited the U. S., he was an admirer of American methods. I remember as a boy in Ireland, in the 1885-90 period, looking through his American engineering papers.

In the Japanese invasion, 1943 and after, I feared the old bridge might have been destroyed, but in 1952 I learned from a friend there that it is still in good shape. With the influx of heavy vehicles a limit had been enforced on the loading, but otherwise the bridge is in normal service. My father used to joke about the dire warnings of engineering friends back in 1865 about the failure sure to come in a tropical climate.

NORMAN DE WIND
Annapolis, Md.

Facts

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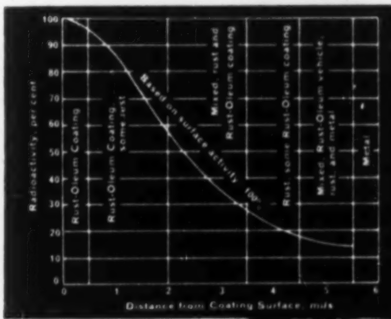

Curved chart line shows Geiger Counter recordings of Rust-Oleum penetration at each mil level.

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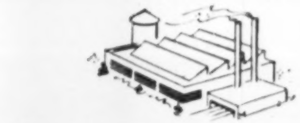

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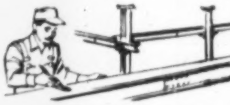

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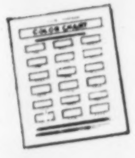

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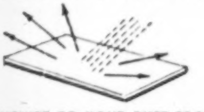

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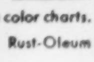

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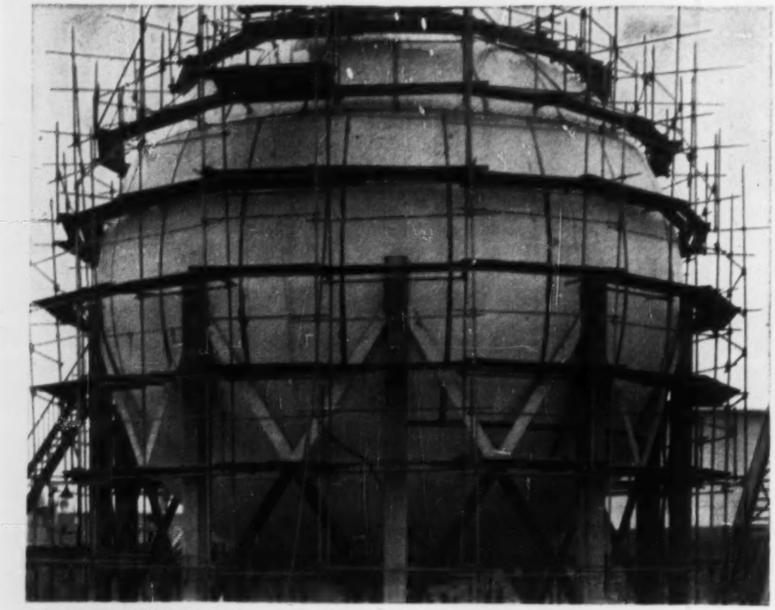
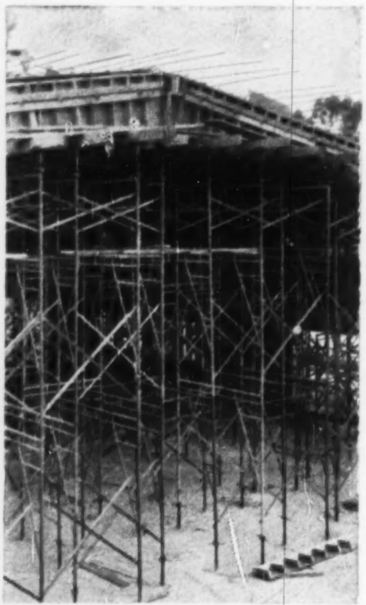
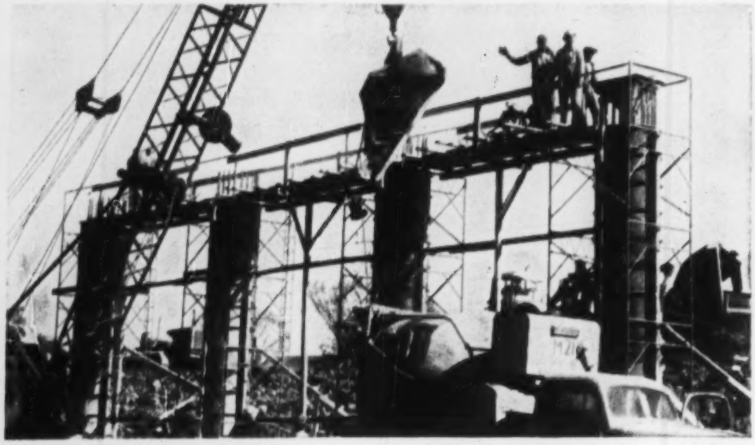
Scaffolding Methods . . . by Patent Scaffolding Co.



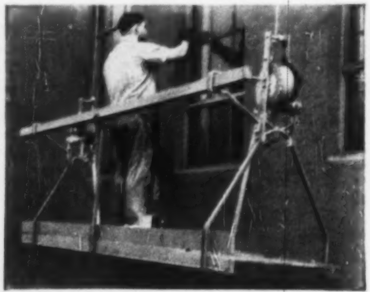
ODD SHAPES—The ability to conform to odd shapes, curved forms, uneven terrain and surfaces makes "TubeLox"® Scaffolding valuable on difficult, hard-to-get-at jobs. Interlocking 2" or 2½" o.d. steel tubes and couplers speeded erection and dismantling of the scaffold for maintenance work on this Union Oil Co. sphere at Wilmington, Calif. Notice how the "TubeLox" Scaffolding is set back to conform exactly to the shape of the sphere permitting workers to get closer to the job.



HEAVY LOAD—"Trouble Saver" Sectional Shoring frames, on 2' 6" centers, speed work on Mess Hall, Marine Corps Base, El Toro, Calif. Heavy, high-arched 62' beam varied from 2' 2" to 3' 6" deep by 1' 6" wide. Allison Honer Co., gen. contr.



SMART ENGINEERING—Accurate positioning of prefabricated "Trouble Saver"® Sectional Scaffolding saves time and money on construction of four pier columns for one of 5 overpasses leading to a lower section of the New York State Thruway. Scaffolding supports vibrating machine and workers, and helped in erection of formwork for above-ground sections of pier shells. Carlo Bianchi, contractor.



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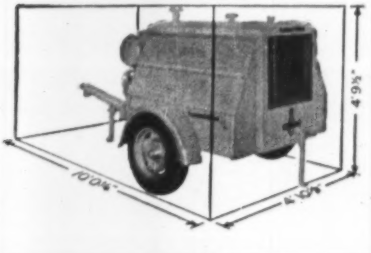

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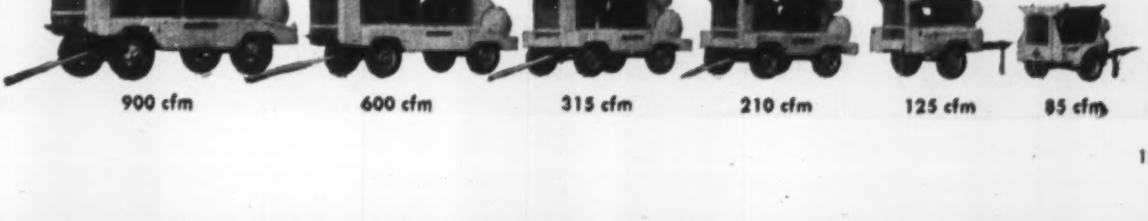

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The advantages a contractor enjoys with a CraneMobile are neatly explained by H. J. Hart of the H & R Transfer & Storage Co. of Phoenix, contractor on the First National Bank Building shown here . . .

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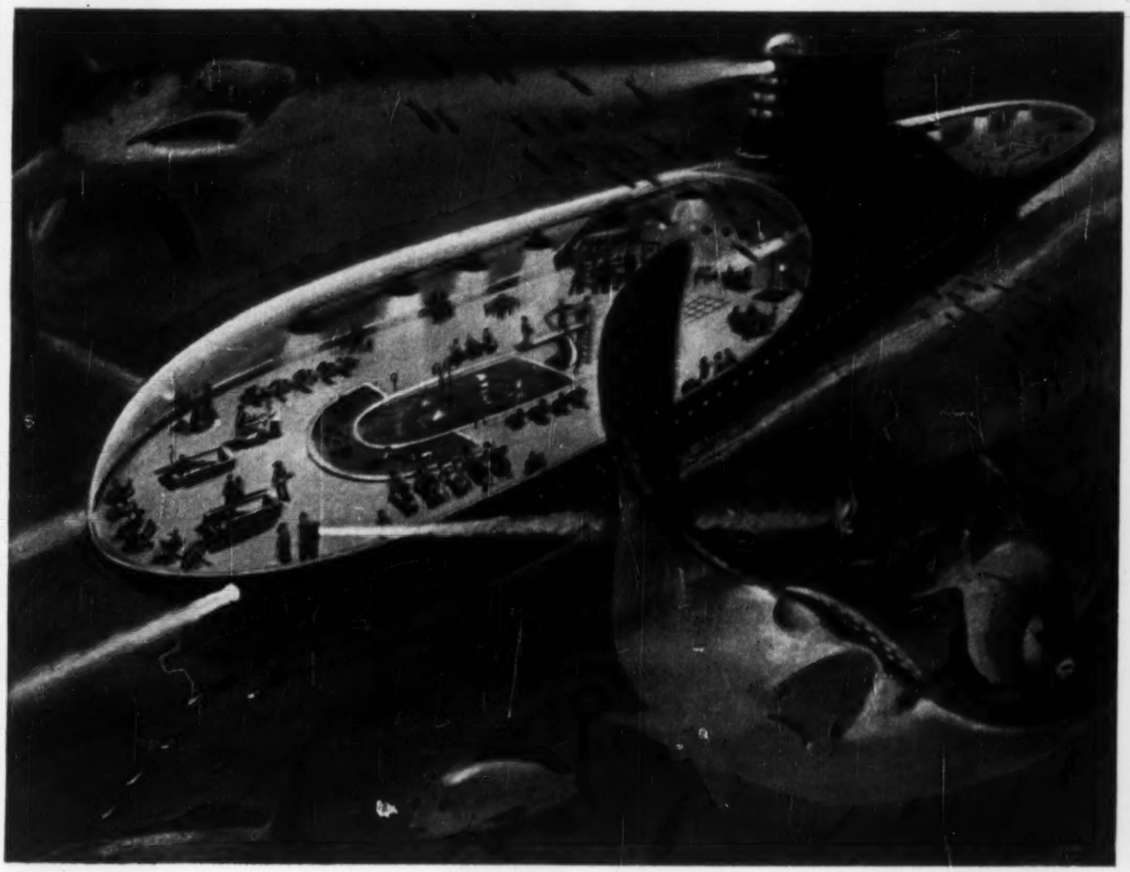

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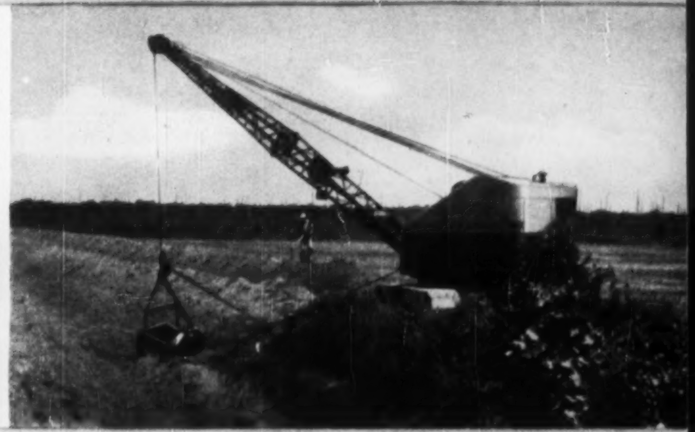
ST. LAWRENCE SEAWAY. For larger, more demanding excavation projects like the Long Sault Canal on the Seaway, contractors prefer big-capacity machines like this Bucyrus-Erie 71-B with 3-yd. bucket.

SAN FERNANDO VALLEY, CALIF. This 54-B with 3-yd. bucket working on a Los Angeles River flood control project for the U. S. Corps of Engineers, demonstrates day after day the big output and dependability for which Bucyrus-Erie machines are well known.

SELMER, TENN. Bucyrus-Erie 15-B equipped with ½-yd. bucket cleans out a ½-mile drainage ditch on a Tennessee farm. You'll find all the essentials of profitable dragline service in Bucyrus-Eries because they are built for superlative service on jobs like yours!



LITTLE ROCK, ARK. Working in gumbo and hard clay, this 22-B with ¾-yd. bucket digs a V-type irrigation ditch for rice fields near Little Rock. Users find that Bucyrus-Erie Bonus Quality pays off in any type of digging.

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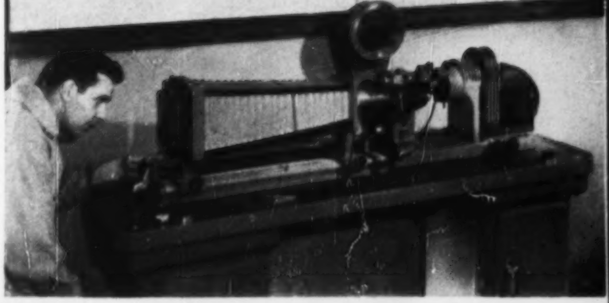

Bonus Quality This research technician is examining the grain structure of a piece of steel. All steel used by Bucyrus-Erie undergoes rigid tests to make sure it comes up to highest standards. This means machines that cost less to maintain and offer many years of extra service.

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ENGINEERING NEWS-RECORD

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CONTENTS

NATIONAL AFFAIRS

Can States Meet Road Bill Challenge 23
Congress Votes 150 Water Project Starts 27
Bids Again Asked on Turnpike Mine Filling Job . . 27
Pollution Bill Now Law—Aid Included 28
Training for Construction Management Urged . . . 29
Delaware Architect Fee Limit Repealed 30
Niagara Rock Slide Bolsters Public Power Position 30
License for Rocky Reach Seems Assured 32
Plans for Two Bridges in Washington State 32

SPECIAL REPORT ON INDUSTRIAL BUILDING

Introduction 37
What Are Industry's New Buildings Like? 38
35 Ways to Cut Building Costs 46
Lighting Developments Promise Bright Future 62
New Levels in Noise Control 74
Power Systems Advance With the Boom 84
New Ways to Heat and Cool 94
Here's Where the Boom Is Heading 103

NEW PRODUCTS

Plastic Tubing Varies Prestress 110
Light Glass-Fiber Dome Speeds Forming 110
Splicing Method Saves on Cost of Watersealing . .112
Disposable Fiber Form 114
Publications 119

INTERNATIONAL

Philippine Hydro Scheme 120
More Aid for Colombian Road Program 122
London Sewage Plant 122
Ganges Bridge Will Open Up North Bihar 124
Koyna Dam Split Into Three Stages 124

MEN AND JOBS

Maj. Gen. C. H. Chorpening Retires From Corps . .126
Chief Engineer for N.Y. Works Bureau 126
American Bridge's New Head 128

BUSINESS AND FINANCE

Handling of New Plant Design, Construction 177
New Plants Lower Production Costs 177
Contracts Dip, But June Awards Set Record 178
Wages and Cement Prices Push Costs Up 178

LABOR

The Davis-Bacon Highway Compromise 180

Reader Comment 10
Washington Observer . 21
Obituaries 134
Unit Prices 137
Materials Prices 138
Construction Reports . .140
Scoreboard 174
Editorials 200

Back issues of ENGINEERING NEWS-RECORD *are generally available for the previous six months. Price 35¢ each copy except Annual Cost Issue. Semi-annual indexes will be sent on request.* ENGINEERING NEWS-RECORD *is also indexed in Industrial Arts Index and Engineering Index.*

THE CONSTRUCTION WEEK

WILL IT BE NEW YORK?—If individual boards of direction of the Founder Societies ratify the recommendation of their "committee of 15," engineering headquarters will stay in New York City. The joint task committee, having a report of management consultants in hand, voted unanimously in favor of staying put, either in remodeled quarters on the same site or at some other midtown address. An earlier committee had favored Pittsburgh. The new recommendation is free from any financial lures.

WELDED BRIDGES GAIN ACCEPTANCE—A poll of state bridge departments by the James F. Lincoln Arc Welding Foundation, Cleveland, Ohio, reveals that 15—out of 39 departments responding to the survey—are increasing their use of welded highway bridges. Another 13 are welding certain details, like cover plates, diaphragms and shoes. Savings reported from use of welded construction range up to 20% of steel tonnage and from 15% to 20% of total cost.

ARCHITECTS' PROTESTS HEEDED—Commissioner Charles E. Slusser notified the American Institute of Architects and New York Association of Consulting Engineers that controversial Sect. 38 of the Public Housing Administration standard contract for architectural services has been revised to meet objections. These organizations had protested an earlier revision of the contract that would require architects to repay the federal government for "any" loss resulting from negligence (ENR March 8, p. 19).

The latest revision holds the architect "liable to the local authority for damages or losses resulting from failure to apply . . . reasonable and proper skill, judgment and care." The AIA and the Consulting Engineers are now at work on a definition of what constitutes "reasonable and proper."

CANADIANS DROP COLUMBIA RIVER DIVERSION TALK—British Columbia Electric Corp. last week announced plans for construction of $250-million Mica Creek Dam on the Upper Columbia River and a future plan for five more dams downstream. A few days earlier Gen. A.G.L. McNaughton, chairman of the Canadian section of the International Joint Commission, stated that: 1) Construction at Mica Creek Dam was feasible, 2) hydro development of the Fraser River should not be considered now, and 3) Mica Creek Dam should be developed by Canadian interests.

The private Canadian utility still has to apply for formal license from provincial and federal Canadian governments. Adding it all up, U. S. observers saw an end to Columbia River diversion talk by Canadians and solid groundwork laid for negotiations as to the U. S. contribution to the Mica Creek program. Who will build Mica Creek is still highly problematical.

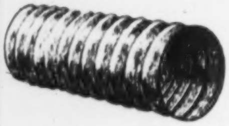
High strength/weight ratio of Wheeling Tri-Rib Steel Roof Deck cuts dead load 8 to 10 lbs. per sq. ft.

This adds up to real savings at no sacrifice of strength. Because as a result less structural steel is needed . . . as much as 20% less! It's *lighter*, it's *stronger*, it's *more economical!* And Tri-Rib Roof Deck is made of Cop-R-Loy Steel for long, dependable life. Qualifies for fire resistance rating as specified by leading insurance companies. Send for details or see our catalog in Sweet's.

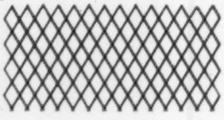
Designed in accordance with specifications adopted by A.I.S.I. for light gauge structures, dated January, 1949

Wheeling

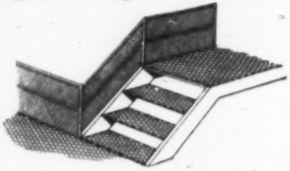
Use these other Wheeling products for economical, long-lasting construction



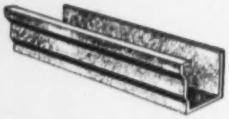
Corrugated Culverts—Copper steel or pure iron. Complies with Federal and all state specifications.



Steelcrete Expanded Metal for Reinforcing — Distributes concentrated loads over a larger area.

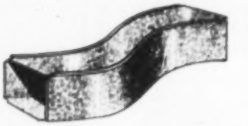


Expanded Metal Railings, Guards, Treads, Walkways. Cuts maintenance. Permits full visibility and ventilation.



Gutters and Leaders—Heavy pure zinc coating. Provides long life, rust-resistance, sure protection.

Metal Lath—Provides the best plaster bond for crack-free walls, complete design flexibility.



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WASHINGTON OBSERVER

Senator Gore's bill to eliminate the Bureau of Public Roads in favor of a new three-man commission isn't likely to get very far.

Gore's idea is that an independent agency is needed now that Congress has gone all out for highway construction.

He says that the present bureau is "utterly inadequate" to handle the job that now confronts it. But most officials feel that the bureau has an excellent record for many years of handling billions of dollars worth of highway building.

A buildup of staff in the Bureau of Public Roads is needed. That's agreed by almost everyone, including Democrats who don't go for Gore's idea of a new commission.

•

Government agencies will be paying their engineers more, starting immediately. The Civil Service Commission has approved new starting pay scales for the so-called middle grades of experienced engineers.

The idea is to counter the drift of engineers to private firms which has been particularly noticeable in these pay grades. A civil engineer who would have been started at $6,390 will now get $7,035; the $5,915 job will now pay $6,590; the $5,440 position starting pay will go to $6,115.

Engineers in these grades get the boost, too if their pay is now running below the new minimums. An estimated 30,000 engineers and scientists of all kinds are in these particular grades; but many are already above these starting minimums.

•

Some added forecasts that feed the boom optimism in Washington:

Construction, in general, is in for another record-breaking year despite the housing downturn. The Commerce Dept., source of the forecasts, sees the year's total at about $44.5 billion, which is $1.5 billion above '55.

Housing will total about $15.5 billion, down a billion dollars.

Industrial and commercial and other construction will up the private total $31 billion.

Education building will total $2.6 billion, slightly up from 1955 but 25% better than 1954.

Public sewerage and pollution abatement construction is 15% above last year.

Public water supply requirements will raise construction in this category 14% above '55.

•

Public power advocates have chalked up victories on important projects hanging fire in Congress. The session-end pressure, with a Presidential election just ahead, has produced votes on projects at Niagara Falls in the East, Hell's Canyon in the West, and on atomic power plants which would go in several areas of the country.

The Niagara vote in favor of New York State development came from the Senate Public Works Committee as a direct result of the huge rock slide of a few weeks back (see page 30).

The Hell's Canyon bills for federal development of the site have now been favorably reported by both House and Senate committees. Chances of getting final approval of both House and Senate are dim—and such a bill would face the threat of a veto by the President. Idaho Power Co., which has a Federal Power Commission license to build at the site, has had construction work under way for several months now.

Construction of $400 million of atomic power plants by the Atomic Energy Commission is authorized by the joint Congressional committee which originates atomic legislation. The measure directs AEC to build an unspecified number of commercial-sized power plants, and some smaller experimental reactors.

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Congress Approves Bill For $33 Billion Roads

But . . .

Can the States Meet the Challenge?

An ENR Staff Report

With the nation's most comprehensive highway bill finally through Congress and now a part of U.S. law, there remains one paramount question:

Can the states handle this increase in highway construction and engineering and can they do it fast?

The answer, as found by ENGINEERING NEWS-RECORD's staff of reporters and editors, is short and to the point:

Yes—with some small qualification.

The states probably will be able to take up the federal money at a faster rate than has been anticipated.

Nearly every state has started to do something about manpower shortages—and although highway officials are admittedly worried, they think they can handle the situation.

Nearly every state has already made some start toward the use of electronic and other devices to speed up engineering work. All states have at least studied the problem and have some idea of what to do about it.

Every state has done considerable advance planning, and every one has some projects on the interstate or urban system well into the design stage or ready to go.

Some states are in better shape than others to handle the financial end of the deal with the federal government. But all are confident that they can find the needed money—most without resorting to added taxation at least for the first three years.

Biggest problem remaining is acquisition of right-of-way—and here again, some of the states have made moves to cope with the difficulty.

The Men

The problem that first comes to mind in considering the expansion of highway construction to a rate averaging more than $3 billion a year is that of woefully short supplies of engineering manpower. No professional or industry meeting within the past three years has neglected to turn serious and worried attention to the problem of attracting and holding engineers for the highway departments.

Surprisingly, though, ENR's survey turned up a fairly optimistic picture.

First of all, every state contacted reported on a number of steps taken or being taken to ease the burden of administrative and other detail work performed by their existing engineering forces.

These steps include simplifications of practice such as using photographs of penciled drawings; elimination of non-essential computations; New Hampshire's determination to get landscaping bids on a lineal-foot basis, rather than paying for each pound of seed, each bale of peat moss, and Florida's streamlining of computation methods so that concrete work and the like can be bid on a lump-sum basis—and payments made to contractors immediately.

(Continued on page 24)

Highlights of Federal Highway Law

When Congress finally passed and sent to the President last week a new federal highway law, it set in motion what has been called the largest single program—short of World War II—ever undertaken by the United States government.

Here's what the law provides:

- **An overall expenditure on interstate, primary and urban roads—by both federal and state governments—of $32.55 billion. Of this, federal funds of $25 billion are provided (over the 13-year length of the program), and $2.55 billion in the first three years (to be apportioned on a 50-50 matching basis) for the primary and urban work. For detailed allotments to each state see table, p. 26.**
- **Sets up a 41,000-mi interstate highway system.**
- **Sets up $25 billion of the total federal money for interstate roads, the remainder to go for primary and urban highways.**
- **Provides for a money apportionment ratio of 90% federal, 10% state for the interstate system; 50-50 on other roads.**
- **Provides that for the first three years (1957-1959) money will be apportioned on the basis of population and area as under previous legislation; after 1959, a needs basis will be established, based on the percentage of uncompleted mileage in each state.**
- **Imposes conditions of the Davis-Bacon Act in relation to labor rates on construction of interstate roads.**
- **Sets up a program of user taxes aimed at raising $14.8 billion of cost to the federal government over a 16-year period.**
- **Places size and weight limitations on big trucks using the interstate system—18,000 lb on single axles, 32,000 lb on tandem axles, gross weights of 73,280 lb.**
- **Makes no provision for reimbursements to states for tollroads or freeways already built but provides for study of this question.**
- **Offers reimbursement to states for payments to utilities for relocations, on the 90-10 or 50-50 basis, depending on which road system is involved.**

MAN PLUS COMPUTER is one answer to the current shortage of engineers.

They include streamlining of office management functions and procedures, to eliminate as much routine paperwork as possible—even to Maryland's delegating to members of its Roads Commission certain office management functions hitherto handled by the engineering department, and California's printing of manuals to serve as guides for administrators.

They include recruitment programs and on-the-job training programs to attract engineering graduates and to assist in upgrading employees already with the departments, and programs to hire sub-professional employees to do more routine work, including drafting. More women, also are appearing in the drafting rooms. New York has even set up a special office charged with recruitment.

And they include—though not always successfully—moves to improve pay scales and to increase allowances for travel, per diem and other expenses. Some state legislatures are beginning to loosen the purse strings on these items, some still have to be convinced.

And the steps are having results encouraging enough to convince the highway officials that they will be able to cope with their engineering needs. Florida, for instance, got nearly 500 replies to a "help wanted" advertisement in northeastern newspapers and hired 25 men as a result; Illinois has had inquiries from qualified men, now attracted by the growing glamour and opportunity in the highway field. Michigan has been able to double the output of its engineering department through better administration, shortcuts and use of machines. (But Kentucky has reported many resignations from its engineering staff; got only one of its State University's 1956 graduates.)

And as a further supplement to the engineering forces, most states are already using—and plan to make greater use if need be—of outside consulting engineering organizations.

The Machines

Most dramatic answer to the manpower shortage and the urgent demand for speed in planning is the wide and immediate acceptance of the help that can be supplied by machines and electronic methods.

Every state has made some use of photogrammetric methods of mapping and surveying. One state, Ohio, has its own photogrammetric equipment —and all are planning to increase their use of this tool rapidly. Several of the on-the-job training courses being given by the highway departments include courses in photogrammetry. A corollary has been the expanded use of regular photographic laboratories that are part of the standard equipment of most state highway departments—for reproduction of drawings, working instructions and the like.

Computers of all types are being pressed into ever greater use—both the more ordinary types of adding and posting machines and the spectacular electronic devices with their capabilities of performing extremely complex, repetitive calculations in a matter of seconds.

Apparently, the leader in this field is California, which is the owner of four super calculators that are used to compute and analyze traffic statistics, to calculate traverses, figure cuts and fills, and do other chores. Moreover, engineers from Virginia, Georgia, Indiana, Wisconsin, Texas and Massachusetts are studying these machine methods in the California department's headquarters.

Arizona is the owner of a calculator too, and Maryland has just placed an order for one of the new calculating machines.

Every other state has made some use of the machines, and every one of them has sent representatives to one of the meetings early this year which were to show off the machines and their capabilities.

The Money

The 90%-federal, 10%-state participation in the program apparently has eased—though it hasn't wiped out —the problem of finding state funds to match the federal contribution.

No state reported that it will have to resort to added taxation on its own to raise funds—at least in the initial years of the program. Some, however, were apprehensive lest in the middle years of the 13-year schedule of the highway bill—when federal outlays reach their peak—they might have to resort to added taxes.

Some few states are presently in better position than others, by virtue of previously authorized bond issues which can be tapped for matching funds. Among these are: Maryland, which figures that most of its federal-aid highway work will be covered by an authorized $568-million bond-financed road program; Ohio, with a $500-million bond issue already sold; Pennsylvania, whose State Highway and Bridge Authority has been authorized to sell a $40-million bond issue for matching funds. Some other states, like Michigan, recently raised their gasoline tax rate and can meet the new demands.

But there are one or two sour notes: Arizona's highway officials contend they don't have enough money to meet the U. S. outlay, but state legislators claim they do; Virginia's governor has called for a special legislative program to consider the state's overall tax structure in relation to the highway program; Idaho thinks it may have to get more tax money later. New York feels its voters should approve a proposed $500-million bond issue to assure later stages of the work.

The Plans

Because a lot of the mileage to be included in the 41,000-mi interstate system is in areas where the states have long since planned improvements on their own or under previous federal-aid legislation, a somewhat surprising amount of highway work is already well out of the planning stage and can apparently get under way immediately. This circumstance will account for the fast take-up of the funds that the ENR survey indicates.

Much of the work that is ready to go is urban work—such as extension of Detroit's expressway system, traffic ways through and around Chicago and a heavy program (which may reach a total value of $1 billion) around New York City.

The best illustration of how well prepared the states actually are is this list of projects reported to ENR as ready for contract letting or at least very near that stage. For instance:

California, says J. W. Vickrey, Deputy State Highway Engineer, has been anticipating the program, and has $40 million worth of jobs ready to go to bid. Biggest significant result will be to see work speeded on a new group of freeways in the southern part of the state, the San Francisco Freeway, and the conversion of Highway 40 over the Sierra Nevada Mountains into a four-lane route.

Illinois will spend about half of the federal money it gets in and around Chicago. And plans have been made for six major downstate construction programs near East St. Louis, between Cairo and Herrin; a bypass around the twin cities of Champaign-Urbana and work in metropolitan Peoria.

Idaho will step up its urban interstate program, with particular attention to U. S. Routes 10, 91, 19, 30 and 30S.

Maryland already embarked on a 12-year highway construction program—would start on: a portion of the Baltimore County Beltway to feed traffic into the new Patapsco River Tunnel; the Maryland portion of the Washington circumferential highway; a piece of the Washington National 'Pike from Rockville to the District of Columbia line; and a section of Route 40 west of Hagerstown. The state hopes that work will be done on the long-projected Northeast Road from Baltimore to the Pennsylvania line.

Ohio, which figures it can immediately finance $227 million worth of projects, adds that its expanded engineering staff and program put it in position for a head start on much work—but not including anything on the much-debated north-south Turnpike No. 2.

Pennsylvania has these projects ready for action: Extending the Schuylkill Expressway to link with the Walt Whitman Bridge across the Delaware River; connecting the Penn-Lincoln Parkway with the Pennsylvania Turnpike; construction of a new bridge at Harrisburg; construction of a new Route 111 south of Harrisburg to the Maryland line; work on Route 6 across the northern part of the state, and many others.

Michigan Highway Commissioner Charles M. Ziegler, authorized immediate contracts for 219 mi of road at a cost of $146.3 million, including work on U. S. Routes 12, 16, 23 and 131.

Florida is ready to go ahead with plans to develop urban roads in Miami, Tampa and Orlando and other work around Daytona Beach and Jacksonville.

New York has undertaken preliminary studies of all interstate highways not yet constructed and designs are under way and contracts will be let during the current fiscal year for the first nine projects under the new bill. State officials "confidently predict" that all federal funds for the primary, secondary and interstate systems will be assigned within the year.

First projects ready will include: The first leg of a "Northway" north from Albany; the Penn-Yan Expressway north of Syracuse; the White Plains section of the Cross-Westchester Expressway; completion of the Major Deegan Expressway to the Triborough Bridge in New York City and approaches to two major bridges which are planned—the Throgg's Neck Bridge across Long Island Sound and the Narrows Bridge between Brooklyn and Staten Island.

Connecticut—with its peculiar problem of heavy population concentrations in a small area—will concentrate much of its initial work on urban bypasses and connections. This will include: U. S. Route 5, the Hartford-Springfield Expressway running south from the Massachusetts line; sections of U. S. 6 near Danbury, Newton and between Hartford and Waterbury, and widening of three stretches of State Route 15. Also now up for consideration (though they were originally scheduled for "some time in the future") are a $100-million Hartford east-west highway and relocation of heavily traveled Route 5 north of New Haven.

Right-of-Way

The prime problem for most states is that of right-of-way.

Some few—notably New York—are aided by new legislation and money, in either prior acquisiton or being able to freeze certain lands for future purchase, to prevent wild fluctuations in price. In all, some 12 states have legislation now on the books to aid their highway departments in this regard.

But in the others the problem is already a serious one and will get worse. New state legislation is definitely called for lest the costs of the new roads get out of hand before a yard of pavement is put down.

New York State's Department of Public Works this year received an authorization from Governor Harriman to set up a $20-million revolving fund for purchase of property required for highway construction, and John A. Johnson, department head, credits the fund with materially easing the department's problem in this regard. Pennsylvania's Highway Bureau has a condemnation law permitting it to take 120-ft wide rights-of-way, and contemplates no trouble in this regard.

Maryland's previously-approved 12-year highway program has put the state in a somewhat peculiar position on right-of-way, in view of the acceleration to be provided by the new federal money. The program is broken into three four-year sections, and right-of-way acquisition has gone ahead in good shape under the first section, and some for roads planned for the second four-year period. But roads originally scheduled for work eight years in the future may now be eligible for more immediate attention—and on these the state is tied by its laws so that right-of-way may present a problem.

(Continued on page 26)

Standards for Highway Program Discussed

A meeting of key importance to the huge new highway program has been set for Chicago, July 11 through 13, when the American Association of State Highway Officials will gather to discuss recommended engineering standards for the new roads.

A preliminary session on this subject—at which the standards were discussed by AASHO's executive and planning and design policy committees—was held for three days at Kansas City, Mo. late last week. Rex M. Whitton, chief engineer of the Missouri State Highway Department and AASHO president, said final approval of the standards would be sought at the Chicago session.

The standards that AASHO will consider have in fact existed for more than a year—an inch-thick document has been in the hands of officials of the organization and of the Bureau of Public Roads for consideration. Acceptance has been delayed because of the uncertainties of the progress of the $33-billion highway bill through two sessions of Congress.

But with the highway bill now a fact and states announcing a surprising total of work to go to contract, final editorial changes and other adjustments will be made and the standards put up for official approval as quick as possible.

Also up for discussion at the Chicago meeting will be details of the new 12-mi test road to be built between Ottawa and LaSalle, Ill.

Materials, Labor

Barring the prospect of some major and prolonged labor troubles, nobody seems unduly worried about materials. Most seem certain that the materials will be available, or that substitute methods or materials can be found in the event of local shortages.

As a step in the direction of anticipating delays in deliveries, however, many states have already started or are considering such moves as pre-advertisement of bids to permit contractors to get their orders to the mills well in advance of actual construction. New York State did this only a few weeks ago, in calling for superstructure bids for a new Hudson River crossing on the state's Thruway near Albany several months in advance of letting contracts for substructure.

As to labor, the worry in some states is the application of provisions of the Davis-Bacon Act on minimum wages—not any prospect of difficulty of getting men. Some states, like New York and other eastern areas, anticipate no trouble with Davis-Bacon minimums, since their own minimums are equal to or above what D-B would require. Many others, however, are afraid that arbitrary application of the act can upset the state's general construction wage structure. (A more complete discussion of Davis-Bacon, its effects and applications, will be found in the "Labor" section of this issue, on p. 180.)

Allocations in the First Three Years

(IN MILLIONS OF DOLLARS)

	— First Three Years —				
STATE	Primary Highway System ($832.5)	Secondary or feeder roads ($555.0)	Urban Highways ($462.5)	Interstate System ($4,700.0)	TOTAL ($6,550.0)
Alabama	17.4	13.5	6.1	95.4	132.4
Arizona	12.1	8.3	1.8	53.9	76.1
Arkansas	13.7	11.2	2.6	68.3	95.8
California	38.5	19.6	41.4	268.0	367.5
Colorado	15.2	10.1	3.9	64.2	93.4
Connecticut	5.5	2.8	9.0	45.3	62.6
Delaware	4.2	2.8	1.0	29.4	37.4
Florida	13.4	8.7	8.4	79.9	110.4
Georgia	20.3	15.6	6.7	109.5	152.1
Idaho	10.1	7.2	.9	47.5	65.7
Illinois	32.4	17.6	32.6	221.6	304.2
Indiana	19.6	13.5	11.1	114.3	158.5
Iowa	19.9	14.6	5.5	95.9	135.9
Kansas	19.6	13.7	4.4	85.3	123.0
Kentucky	15.4	12.9	4.8	88.2	121.3
Louisiana	13.1	9.5	6.8	77.6	107.0
Maine	7.0	4.9	1.9	37.8	51.6
Maryland	7.6	4.6	7.8	56.4	76.4
Massachusetts	10.9	4.1	19.4	100.3	134.7
Michigan	26.1	15.9	21.7	169.0	232.7
Minnesota	21.4	15.0	7.6	105.9	149.9
Mississippi	14.6	12.2	2.6	74.6	104.0
Missouri	23.9	16.1	11.5	127.3	178.8
Montana	16.7	11.6	1.1	67.5	96.9
Nebraska	16.4	11.6	2.8	67.4	98.2
Nevada	10.5	7.0	.4	49.1	67.0
New Hampshire	4.2	2.8	1.4	29.4	37.8
New Jersey	11.1	3.8	20.4	102.9	138.2
New Mexico	13.2	9.1	1.5	57.0	80.8
New York	39.9	16.0	62.2	333.2	451.3
North Carolina	20.7	17.8	6.0	119.8	164.3
North Dakota	11.8	8.5	.9	52.1	73.3
Ohio	29.3	17.8	26.9	201.2	275.2
Oklahoma	17.6	12.6	5.0	84.1	119.3
Oregon	13.9	9.8	3.7	63.9	91.3
Pennsylvania	33.9	20.2	35.3	251.9	341.3
Rhode Island	4.2	2.8	3.3	29.4	39.7
South Carolina	11.1	9.2	3.2	63.2	86.7
South Dakota	12.4	8.9	.9	54.5	76.7
Tennessee	18.0	14.1	6.7	100.6	139.4
Texas	53.5	35.9	22.3	270.1	381.8
Utah	9.4	6.3	1.9	45.8	63.4
Vermont	4.2	2.8	.6	29.4	37.0
Virginia	16.1	12.4	7.2	95.1	130.8
Washington	13.8	9.2	7.0	75.5	105.5
West Virginia	9.1	8.0	3.0	56.0	76.1
Wisconsin	19.5	13.6	9.1	107.0	149.2
Wyoming	10.4	7.1	.4	48.9	66.8
Hawaii	4.2	2.8	1.5	.....	8.5
District of Columbia	4.2	2.8	4.1	29.4	40.5
Puerto Rico	4.4	4.6	4.0	.....	13.0
Alaska	16.9	11.5	.2	.....	28.6

From another source

AGC poll indicates that states can handle program

With passage of the highway bill, the Associated General Contractors, last week polled its member chapters in 20 states, and they happily predicted that hundreds of millions of dollars worth of highway construction work would go to contract stage before Dec. 31.

The estimates—exclusively for additional projects under new highway authorization—indicate that more than $100 million will be signed within the next two months, and the total at year's end will be about $400 million.

Bulk of the new awards will be on the interstate system, with a small percentage on other federal-aid roads. Most states will encounter no difficulty in taking hold of new opportunities, but some, with tollroad construction and regular road programs moving at peak, will be handling no more work than they are at present.

Consensus on other points by highway association and governmental agency representatives present were:

- Engineering productivity will be boosted by new methods and devices.
- Contractors can expand rapidly to handle more work and bigger projects to reduce cost.

Competition will be keen holding highway costs below cost levels of construction in other fields.

- Neither Davis-Bacon predetermination of wages nor imminent action on final design standards for interstate construction will hold up contract awards.
- There are no obstacles in sight—engineering, materials, working force, equipment or contractor capacity—to limit ability to handle full volume of work.

Federal public works funds up as . . .

150 Project Starts Are Voted

Congress rolled up an impressive total of new construction starts in the public works appropriation bill that the House and Senate approved last week.

Flood control, navigation and reclamation allotments in the bill include more than 150 new projects to be started during the fiscal year that began July 1.

These new projects will cost $2 billion to build, on the basis of current estimates. They make a fat increase in the backlog of future construction to which the federal government is committed.

Water resources developments now under way require some $3.75 billion to complete. The additional projects for which the bill provides starting money fatten this backlog to nearly $6 billion, which will be an increase of more than 50% in construction commitments for water resources undertakings.

Disregarding the Administration's suggestion, Congress voted small construction funds to start three big jobs in the Arkansas River Basin. These three projects in themselves call for expenditures of $385 million. Beyond this which is included in the backlog figure, the government will have to spend more than $700 million additional to complete the regulating and navigation scheme before benefits of the first three costly projects can be realized.

• Money exceeds '56—In construction dollars to meet contract payments during fiscal 1957, as well as in new projects added to the backlog, this year's bill equals or exceeds the figures in the totals that were approved last year.

Including Mississippi River flood control, construction money for the Corps of Engineers this time comes close to $520 million. That sum is considerably greater than the $493-million total appropriated in fiscal 1956 including the emergency reconstruction in the flood-damaged Northeast.

New construction money for the Bureau of Reclamation just about equals last year's appropriation, and includes $13 million for Upper Colorado River development. The amount in the bill is $144 million for construction. It includes money for seven new starts, increasing the reclamation backlog of committed construction to $1.7 billion.

Even larger totals of new starts are added by the bill to the civil works construction program of the Corps of Engineers. Starting funds are appropriated to begin work on 146 projects that will cost nearly $1.3 billion. With these additions the government stands committed to more than $4 billion of construction work on flood control and rivers and harbors projects to be carried out by the Army Engineers.

• Arkansas River starts—Eisenhower asked for 94 of the new Army Engineer starts, costing not quite $500 million. Congress added 52 projects that will cost nearly $800 million to complete, among them the three projects in the big Arkansas River Basin multipurpose projects scheme. Last year, Congress had approved small amounts for two of these projects, involving the $153-million Eufaula Dam in Oklahoma and the $95-million Darndenelle Lock and Dam in Arkansas. The Army Engineers didn't start these heavy jobs with the small sums provided, and Eisenhower this year asked Congress to hold off any further Arkansas River commitments. Third project to be started in fiscal 1957 is the $137-million Keystone Dam in Oklahoma.

For the hurricane-harrassed Northeast, the new bill appropriates funds to start construction of 12 new flood-control projects that are estimated to cost nearly $90 million.

• More big starts—Other major projects that receive construction starting money in the new bill include: The $150-million Great Lakes connecting channels, the $167-million Barkley Lock and Dam on the Cumberland River, the $61-million interim 35-ft dredging of the Delaware River, Philadelphia to Trenton, a $54-million lock and dam on the Ohio River at Louisville, a $25-million second power plant for Peck Dam, the $35-million Wilson Lock on the Tennessee River, the $24-million Jackson Lock and Dam in Alabama, the $19-million Terminus Reservoir and $14-million Success Reservoir in California, the $19-million Pomme de Terre Dam in Missouri, and a $15-million flood-control project being constructed at San Antonio, Tex.

Heavy construction allotments for continuing work go to these projects of the Bureau of Reclamation: Central Valley, California, $19.4 million; Columbia Basin, Washington, $13.8 million; Solano, Calif., $12.2 million; Glendo, Wyoming, $11 million, and Weber Basin, Utah will receive $10 million.

Large construction appropriations for Corps of Engineers projects include: The Dalles Dam on the Columbia River, $42.5 million; Oahe and Garrison Dams on the Missouri, $27.5 million and $16 million, respectively; Los Angeles County flood control, $17.5 million; Table Rock Reservoir in Missouri and Arkansas, $14.7 million; and Hartwell Reservoir in Georgia and South Carolina, $10 million.

Bids to Be Opened on Mine Filling—Again

The Pennsylvania Turnpike Commission will open bids July 9 for the filling of abandoned mine workings under the right-of-way of the pike's northeast extension in Lackawanna County, located particularly in the Scranton area.

The new contract, when awarded, will replace $2.3 million worth of contracts for the same work, cancelled by the commission more than a month ago after an action taken by the state had lodged charges of conspiracy to defraud against officials of the Rogers Construction Co., Scranton, Pa., and an employee of Manu-Mine Research and Development Co., Reading, Pa.—two of three contracting firms engaged in the work (ENR May 10, p. 27).

Meanwhile, the cancellation of the original contracts continued to breed legal troubles for the state. The Manu-Mine Co., which held a supervisory contract on the original work, filed two additional lawsuits against the Turnpike Commission, bringing the total of payments that have been asked by the firm to more than $1 million.

Almost immediately upon cancellation of its contract, Manu-Mine had filed suit for $942,852 for work it claimed had been completed and accepted by the commission prior to cancellation of the contract. The two additional suits, for a total of $154,053.46, seek pay for concrete for certain holes drilled by Manu-Mine in the course of its work, and for "standby" damages the firm claims for the period between Feb. 27 and April 26—a period during which it was ordered to halt its activities, prior to the cancellation.

Commission officials said that specifications for the new contracts would call for a different method of filling the old mine workings than that followed by Manu-Mine and the other original contractors that were working on the project.

Provisions for federal aid to sewage works evolve . . .

. . . From original proposal	. . . To final formula
• $100 million a year for 10 years	• $50 million a year for 10 years
• State agency must approve project as part of a comprehensive program	• State agencies to certify projects as entitled to priority for aid on basis of financial as well as water pollution need
• Grants not to exceed 50% of project cost or $500,000, whichever is smaller	• Grants not to exceed 30% of project cost or $250,000
• Surgeon General to make federal funds available in manner to result in "wide distribution of funds among the several areas of the U. S."	• Funds are to be apportioned among the states according to formula: 50% on basis of population; 50% in inverse ratio to per capita income.

Pollution Bill Now Law—Aid Included

The new federal stream pollution control law has been voted—with its $500-million fund for building municipal sewage treatment plants. And as the issue of federal aid was finally settled in Congress, many of the misgivings—fears it would misfire—gave way to a fresh optimism.

The formula evolved for disbursing the federal aid is the key to a new attitude among federal government engineers and administrators. Section 6 of the law was transformed in conference committee from a loosely worded provision for "wide distribution" of funds for construction to a final wording that intends to have state water pollution control agencies see that the aid is administered where it will do most good. Aid is to be distributed on the basis of financial as well as water pollution control needs.

House Democrats first proposed a billion dollar, ten-year project with cities to match federal funds that could run up to $500,000 a project. This was later trimmed to a $500-million program, with each project to draw on federal funds up to one-third of cost or $300,000. As finally enacted, the law will limit federal contributions to 30% of the cost of each project, or $250,000—whichever is smaller. And half the funds must go to cities of 125,000 population or less.

The new limits, and the prescribed method for disbursing the funds, are expected by engineers of the Public Health Service to be a stimulus to new construction which without aid might not be undertaken. PHS's unofficial appraisal: "The 30-70 formula . . . should stimulate a moderate increase. We look for a stemming of the tide that has created today's $2-billion backlog."

• How funds will be allotted—A municipality (or group of municipalities) will apply to its state water pollution control agency for certification of a needed project. The state agency will determine whether this project has priority over projects of other applicants for federal aid in its state. It will look at the ability of the municipality to finance its project without federal aid; it will establish whether the project is vital to its comprehensive pollution control program.

Projects the state agencies certify as of high priority for grants-in-aid will be passed to the Surgeon General of the U. S. Public Health Service. He, in turn, will look at the city's ability to obtain the balance of construction funds and to build and maintain the needed plant properly. If the Surgeon General is satisfied (and assuming an annual authorization up to the $50-million limit has been appropriated) PHS will allot its share to the worthy city directly. No money will pass through state hands.

The full $50 million per year, if appropriated, would be allocated among the states to give New York the biggest grant, $2.7 million, and Delaware a low of $352,000. States whose cities could receive a total over $2 million: N. Y., Calif. and Pa. States in the $1-million to $2-million range: Ala., Ark., Ga., Ill., Ind., Ky., Md., Mich., Miss., Mo., N. J., N. C., Ohio, S. C., Tenn., Tex. and Va.—plus Puerto Rico. The remaining states territories and the District of Columbia would all be allotted less than $1 million each of the maximum $50-million annual appropriation. Appropriated funds may be carried over, beyond the fiscal year, until spent.

The law provides "grants for construction" but in defining construction it also includes "reports, plans and specifications in connection therewith." It also defines a "project" as including land acquisition and remodeling or extension of existing works.

• Enforcement, administration, research—Aside from its aid provision, the law passed without major change from H.R. 9540 (ENR May 10, p. 29). It gives the federal government last-resort powers to take an interstate stream pollutor into court after a prescribed procedure of investigations and hearings.

To aid in administration of pollution abatement at state and interstate levels, the law provides $3 million per year for five years to be matched by the agencies. This money is to be spent by the agencies in carrying out their programs; this can include training and placing added engineering personnel in the field of water pollution control. Any money appropriated under this provision must be spent within the fiscal year of appropriation.

The law also includes a mandate for the PHS to spend $2 million to $3 million on research projects each year. This money would be authorized separately.

Finally, the new law establishes in PHS a Water Pollution Control Advisory Board which will include the Surgeon General or his sanitary engineer officer plus nine Presidential appointees, not to be federal employees.

Contractors and educators exchange views on . . .

Training for Construction Management

Engineering educators and contractors sat down together last week at Iowa State College in Ames to talk over ways and means of improving education for construction men.

The problem—how to provide special college training for future administrators of the construction industry—was the prime topic of the first special Summer School on Construction Education sponsored by the Civil Engineering Division of the American Society for Engineering Education.

Top management in construction needs replacement. One estimate puts 42% of present executives within 10 years of the 65-year retirement age.

A survey by the Associated General Contractors on engineering manpower needs of contractors indicates a need for about 13,000 young engineering graduates during the next three years and 20,000 during the next five years. Total output of civil engineers this June was 4,400 (ENR June 21, p. 21).

• Special Training Required

Contractors challenged the young engineer to embrace the field of construction management. They pointed out that the administrative problems of the general contractor require special training for which he should get a background through additional courses of study at the college level.

From the contractors' viewpoint, a civil engineer is not properly educated for the involved task of becoming a successful administrator of construction. He must also be a good businessman and have special training in economics, banking, labor relations.

From the educators' standpoint, the difficulty is to re-arrange the educational framework to prepare students for construction. How can courses from various departments be worked into a logical construction program? Educators believe that courses should be basic; that there should be no future splinter courses. Nevertheless, some 36 colleges and universities offer courses for the building industry in 28 states, which in one sense or another are business courses.

• Many Possible Programs

The major problem is to sell the usefulness of the idea of construction courses to college faculties and administrative staffs. And it has been pointed out that there are many possible programs:

- General engineering undergraduate program followed by graduate work in construction engineering.
- Civil engineering undergraduate program with an option in construction, specialization in at least the senior year.
- Construction engineering undergraduate program with specialization for the construction field throughout the program.
- Business administration undergraduate program followed by graduate work in construction management.
- A combined engineering and business administration undergraduate program.
- Business administration or combined business and engineering graduate program with emphasis on subjects useful in the construction field.

Other combinations may develop men that can complete their training on the job in construction.

What does the contractor ask of the educator? William A. Klinger, president of W. A. Klinger, Inc., Sioux City, Iowa, says: "Contractors feel strongly that education for our industry should be recognized and dignified with a special degree such as Bachelor of Science in Construction Engineering."

Klinger points out that:

The construction administrator is constantly confronted with a great diversity of complex problems in human relations, business practices, contractual relationships, labor negotiation and labor law—to which can be added increasing variety and complexities involved in the structure he builds. The 1950 Census shows that there are 125,568 trained civil engineers in the U. S. and 47% of them are in actual construction work. Practically none of these are specially educated for administering construction organizations, claimed Klinger. It is this situation the construction industry wants the colleges to correct.

Resolutions Passed Include:

• Continuation of the ASCE-AGC cooperative committee.

• Extension of engineering curricula to fit graduates for the construction field, through—

1. Introductory courses in construction management.

2. Added stress on construction concepts in present courses.

3. Additional construction courses as electives.

4. Options in construction and management.

5. An entire separate undergraduate curriculum.

6. An M.S. in civil engineering (construction).

• Participation by the construction industry in student guidance work; financial-aid to colleges; summer employment of faculties, students; instruction and guest-lecturing.

• Joint effort by contractors and educators to get, pay and keep qualified instructors of construction courses in the schools.

• Intensified recruiting into construction courses.

The special summer school followed the 64th annual meeting of ASEE at Iowa State College June 25 to 29. Ideas on education for the construction industry also played a star role at the annual meeting.

Tyler S. Rogers, technical consultant for the Owens-Corning Fiberglas Corp., told the 1,124 delegates and members from 160 engineering colleges and institutes and industries that existing colleges and universities can establish "Schools of the Construction Arts and Sciences" by regrouping and some extension or re-orientation of existing faculties and curricula.

• General Knowledge Urged

One of the chief objectives of this proposal would be to enable the student majoring in one of the many facets of the construction industry to absorb a general knowledge of the many other departments or study areas related to his major without necessarily taking credit courses in each area.

Rogers says the present system leads to what he calls excessive compartmentalization. "We teach the various engineering fields as sciences, or architecture and landscape architecture as arts without teaching how they relate to each other or depend on each other in subsequent years of professional practice." Rogers says what is needed is greater integration within the building industry. And that integration should start with the educational process, which now tends toward segregation or compartmentalization and disharmony.

Rogers asserted that about the only thing concerning the construction industry that has not greatly changed for the better since World War II is the educational pattern young men must follow to fit themselves for the leadership opportunities it affords.

Niagara: Final Round

More than rock slid at Niagara—so did private companies' power hopes

Necessary action on Niagara power, made urgent by the Schoellkopf rockslide (see also p. 200), seems now imminent. And the rockslide that did the damage also seems to have demolished much of the opposition to a public power agency's developing the excess water at the falls.

After nearly six years of wrangling between public and private power interests, it looks as if a bill to let the Power Authority of the State of New York construct a $440-million facility at Lewiston will reach the House floor for action this week or next. Such legislation (the Lehman Bill) has passed the Senate and won approval of the House Public Works Committee late last week.

PASNY Chairman Robert Moses says that if Congress approves the Lehman Bill, the Niagara plant will be built in three years, to have a capacity of 1,700,000 kw.

Until June 7, it looked as though the issue of who would build at Niagara would go unsettled indefinitely, while Canada continued to use the U.S. portion of flow as permitted under the 1950 Treaty. But with the 360,000 kw of Niagara Mohawk capacity that slid into the gorge that day, went most of the company's energy for continuing the fight.

It has lost two-thirds of its major plant, and rather than lose its customers, Niagara Mohawk took leave of the four private companies with which it has sought to build at Niagara, sought instead a deal with the state's Power Authority.

With house action still needed to settle the issue finally, it looked as if:

- Schoellkopf Station will not be rebuilt.
- PASNY will build at Lewiston, using the unused water, plus that which Niagara Mohawk had license to use at Schoellkopf until 1971.
- Private utilities will buy power from PASNY, and—unless a preference clause in the bill is removed—after municipalities, rural-electric co-ops, and federal agencies have been given first crack.
- Niagara Mohawk will be able to buy from PASNY the power it lost at Schoellkopf.

Black Denim Trouser Trouble

Black denim trousers—particularly the type worn by those who ride motorcycles to boot—are causing tie-ups at California bridge toll plazas.

According to Norman C. Raab of the Division of Bay Toll Crossings, "The motorcycle drivers wear those tight pants. And they can't get into their pockets to get change without stopping the motorcycle and getting off."

This is why Raab plans to ask the Toll Bridge Authority to triple its proposed 25-cent fare for motorcycles on the soon-to-be-opened Richmond-San Rafael Bridge. He would bring the rate up to the 75-cent automobile toll.

Tucson Report Recommends $3.6-Million Parking Plan

Two four-story city-owned garages and a nine-story pigeonhole type facility have been proposed to ease parking problems at Tucson, Ariz.

The projects, estimated to cost $3.6 million, are recommended in an $8,000 survey on off-street parking sponsored jointly by the city and downtown merchants.

The pigeonhole type structure would accommodate 367 cars. The other two garages, which would net an estimated $218,000 yearly with a planned 30-year revenue bond program, would handle 846 automobiles. At present, Tucson provides 4,380 parking spaces, including both curb and off-street facilities.

Architects Win

Delaware's 5% fee limit on school jobs repealed

The Delaware legislature this week approved a bill repealing the controversial 5% limitation on architects' fees under the $50-million School Building Program Act of 1955.

Delaware architects, who had been receiving a 7% fee, had refused to sign contracts containing the 5% limitation for the bulk of the school building program. The result had been a near-total standstill for the huge construction program.

The architects have indicated that they will accept a 6% fee.

S. Samuel Arsht, attorney for Delaware architects, told the Senate that Delaware architects offered a compromise at the 6% level, and that, if the school boards so chose, they can negotiate with out-of-state architects to do the job for lower fees. He also pointed out that the percentage at issue included engineering as well as architectural fees. The custom has been to set aside from 2½% to 3% of total construction cost for engineering fees, leaving the architects with the remainder of the 7%.

I. H. Garton, legislator who spearheaded passage of the 5% limitation, contended that $1 million would be saved—equivalent to 30 additional badly needed classrooms—if the architects' fees were dropped. He said the 7% fee is "the second highest paid in any state."

The architects were backed up by the Delaware section of the American Society of Civil Engineers in the controversy. Ernest S. Van Demark, president of the state group, sounded a warning that out-of-state architects would perform "hurry-up jobs" that result in "unsatisfactory construction."

"Can we actually reduce costs this way," Van Demark asked. "Will not cost of construction increase by poor planning, poor drawings and poor specifications if the architect lowers the quality of his work—which we can assure that he would not?"

Among the lengthy list of organizations opposing the limit were the Delaware Chapter, Associated General Contractors of America; Board of Managers of the Delaware Congress of Parents and Teachers and the Middle Atlantic Regional Council of the American Institute of Architects.

Sewer District Asks Easement Through Private Company Line

The Metropolitan St. Louis Sewer District has filed a condemnation suit to obtain public easements through lines of a private sewer company in St. Louis County.

The private firm—Town Service, Inc.—has refused to allow three new subdivisions in the southern part of the county to connect to its trunk line—the only one available—unless the homebuilders sign over title to the laterals and pay a connection charge of $250 per home. The district's suit would permit sewage from these subdivisions to be carried through the private lines and thence into the District's own collection system—for relatively small fees to Town Service.

Citizen committees appointed by the District have already begun negotiations to acquire Town Service, Inc. and two other private firms.

Seven-Month Survey Indicates Feasibility of Detroit Garage

Detroit city officials said last week that they had established the feasibility of constructing an underground parking garage beneath the city's Cadillac Square.

Following a seven-month survey and investigation, a written council report recommended that further study as to whether the project would be economically feasible was submitted. No cost figures for construction were immediately available.

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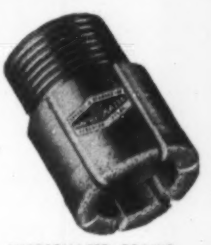

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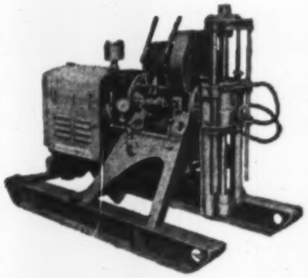

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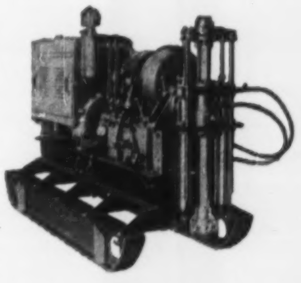

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Rocky Reach Okay

FPC license seems assured, bids to be opened in July

Anticipating issuance of a construction license by the FPC, the Chelan County Public Utilities District of Wenatchee, Wash., expects to open bids July 18 for constructing Stage 1 of its $200 million Rocky Reach Hydroelectric Project on the Columbia River north of Wenatchee. Award of contract will await receipt of the license.

The PUD already has contracted with Bethlehem-Pacific Coast Steel Corp. and U. S. Steel Corp. for steel piling costing $1 million.

Stage 1 will include construction of the east cofferdam, a large part of the 750-ft spillway section, non-overflow dam, east abutment and about 2,000 ft of cut-off blanket on the east bank. Gravel and silt layers on the east bank will be made impermeable by a clay and aggregate blanket and a few cofferdam cells.

Work is scheduled to be started this fall and be completed by August of next year. Stage 1 will involve about half of the 1,200,000 cu yd of excavation necessary for the project, and 22% of the 900,000 cu yd of concrete.

Later contracts will provide for construction of the powerhouse section behind the west cofferdam. The powerhouse section will extend downstream 1,000 ft from the spillway.

The Rocky Reach project will develop 644,000 kw from an initial installation of seven generators, with provision for four more. The power plant will have a head of 95 ft and the dam will form a lake 43 mi long at El 707. Completion of the entire project is scheduled for 1961 or 1962.

Plans for the project are being completed by Stone & Webster Engineering Corp. of Boston, Mass., with John Boyd as project superintendent at Wenatchee and W. W. Griffin as supervising engineer.

Power from the project will be made available to the Chelan PUD and to Puget Sound Power & Light Co., which is assisting in financing arrangements.

Plans for Two New Bridges Gain Headway in Washington

The Washington State Toll Bridge Authority has approved the route and plans for one $4-million bridge and accepted a report indicating feasibility of a second $4-million span.

Approved plans—prepared by Tudor Engineering Co., San Francisco—are for a four-lane toll bridge across Washington Narrows from Bremerton to Manette, parallel to an existing structure. Bremerton and the Washington Highway Department already have agreed to the project. Construction, however, will be delayed until Congress takes action which will permit tolls to be reimposed on the existing bridge.

The feasibility report deals with a proposed bridge over the Columbia River at Biggs Rapids, east of The Dalles, Ore.

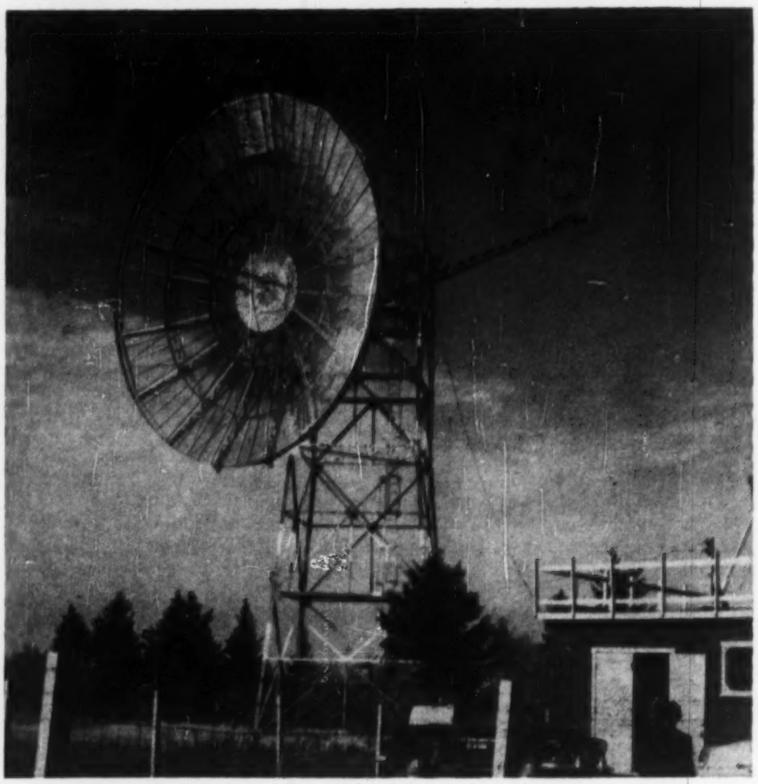
Consulting engineers Frederic R. Harris, Inc., New York, and N. W. Haner & Associates, Portland, Ore., estimate that 707,000 vehicles can be expected to use the bridge in 1959, its anticipated first year of operation.

Air Force Requests Funds for New Jet Strip on East Coast

The United States Air Force has requested the sum of $6,377,000 from the House Appropriations Committee to be used for construction of a 9,000-ft runway at the New Castle, Del., County Airport.

According to the Air Force, extention of present runways to accommodate supersonic craft, is not feasible for topographic features of the existing facilities make it financially prohibitive.

The requested appropriation would include construction of a jet engine repair shop, a test cell and a simulator for training jet pilots. In addition, a swimming pool would be provided as part of the expansion project.



Radio Tower Will Test New Theory

A huge antenna of unusual design has been erected on a 70-ft steel tower atop the most northernly peak of the Adirondack Mountains, near Covey Hill, Quebec on the Canadian-U. S. border. Mounted on one side of the tower, the antenna features a parabolic reflector bowl, 40 ft in dia.

The installation is for experimental purposes, in which ultra-high-frequency radio waves will be beamed to Riverhead, N. Y. —288 mi away—without intermediate relay stations. Until recently, communication engineers believed that radio waves shoot off into space at the horizon. The latest idea is that the waves scatter and some can be picked up at a distance. Elevation of the structure is 1,100 ft.

The reflector is of all-aluminum construction. Radial ribs are light, riveted trusses, and the rim is composed of 4-in. channel sections. The entire inside surface is lined with expanded aluminum wire mesh.

Design, fabrication and erection were by the Dominion Bridge Co. to specifications prepared for R. C. A. Victor Co., Ltd., by Bruce MacKimmie.

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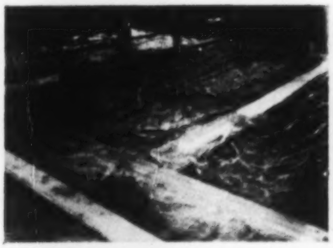

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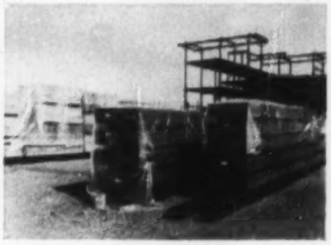

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You don't get an expansion joint like the one shown on the opposite page every day in the week, so we thought it would prove interesting both to architects and contractors to show how this particular joint was constructed.

To make it easy to follow we have shown both photographs and details of the various steps. This particular joint bridged the gap caused by adding a new section to an existing plant.

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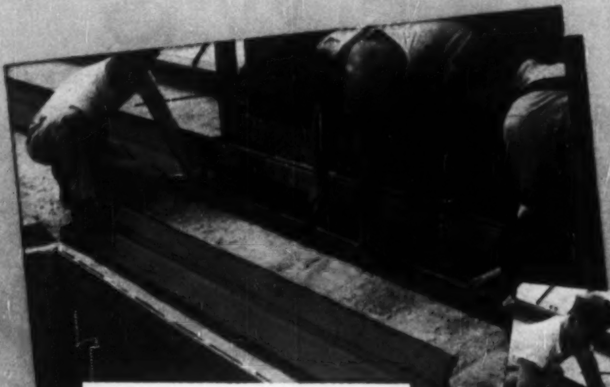

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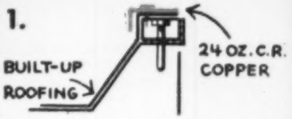
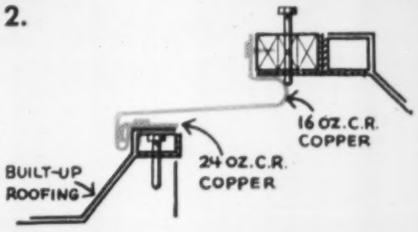

24 OZ. C.R. COPPER
BUILT-UP ROOFING

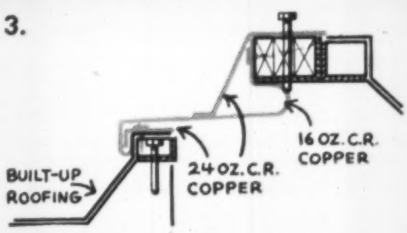
PUTTING FASTENING STRIP into place. 24 oz. Revere Cold Rolled Copper was used.

2.


16 OZ. C.R. COPPER
24 OZ. C.R. COPPER
BUILT-UP ROOFING

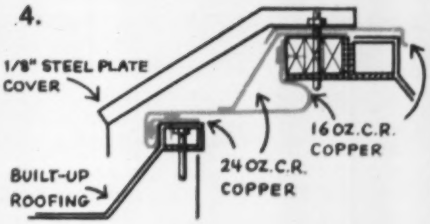
PREFABRICATED 8' STRIPS were then put into place. Here 16 oz. Revere Cold Rolled Copper was used.

3.


16 OZ. C.R. COPPER
24 OZ. C.R. COPPER
BUILT-UP ROOFING

24-OZ. REVERE COPPER COVER STRIP was then put into place. This strip acts as a run-off and prevents seepage into the joint.

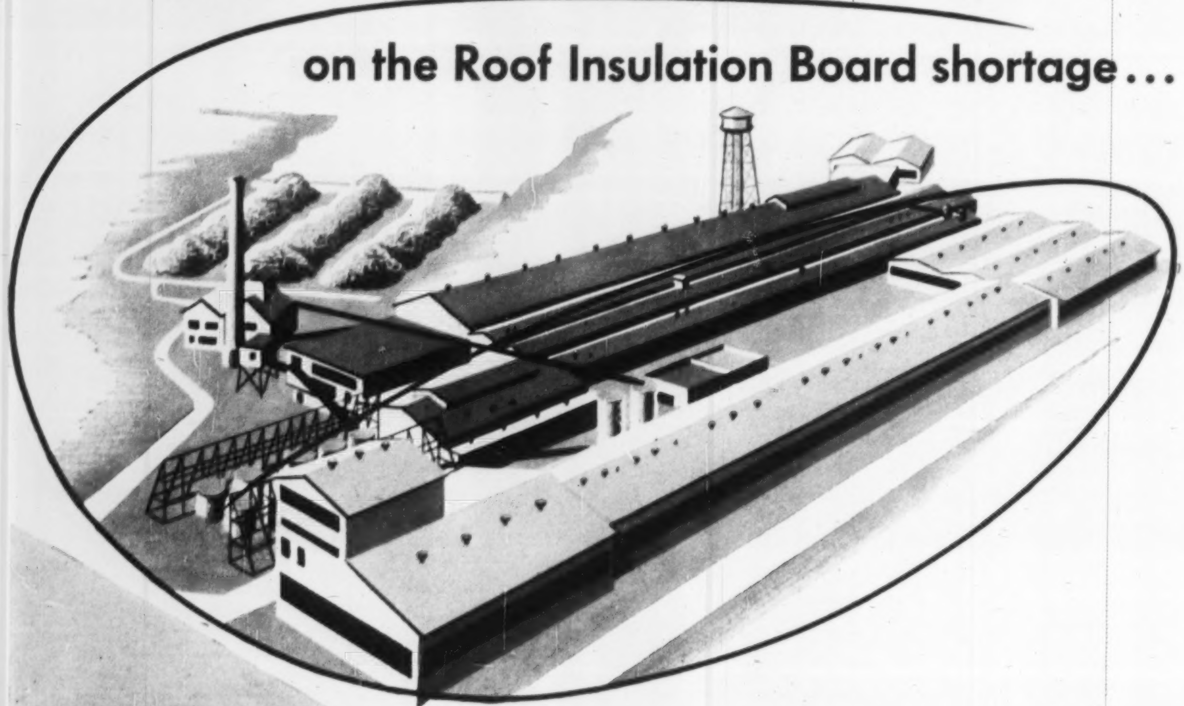
4.

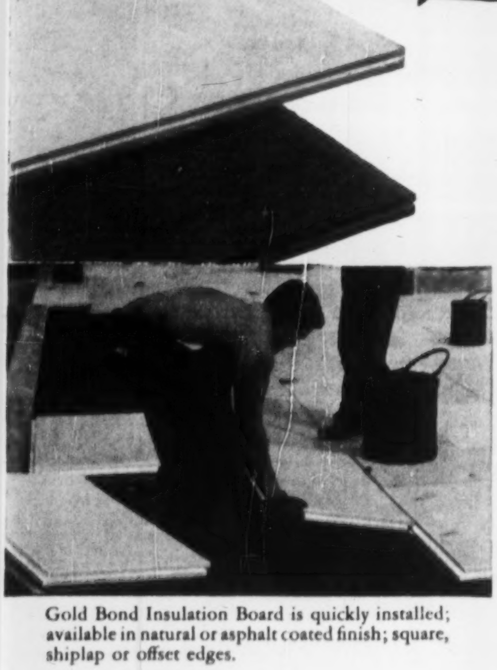

1/8" STEEL PLATE COVER
16 OZ. C.R. COPPER
24 OZ. C.R. COPPER
BUILT-UP ROOFING

JOINT WAS THEN FINISHED OFF with 8 ft. strips of 16 oz. Revere Sheet Copper as shown above. Note that in every case the copper strips were prefabricated in the shop and delivered on the job ready for instant assembly. Prefabrication saves time and trouble on the job, avoids delays caused by bad weather.

SPOT NEWS

on the Roof Insulation Board shortage...





Gold Bond Insulation Board is quickly installed; available in natural or asphalt coated finish; square, shiplap or offset edges.

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Take advantage of the increased availability of this much-wanted material—specify Gold Bond Roof Insulation Board. National Gypsum Company, Buffalo 2, New York.

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Gold Bond
BUILDING PRODUCTS

An ENR Staff Report

Building for Industry—

• Better • Faster • Cheaper

NO doubt about it now—industry is building new plants at an unprecedented rate. Fine for the moment; designers and builders are accepting contracts as they are offered. But some thought should be given to the future.

An unprecedented highway program is about to start; federal aid for schools might spark another enormous program; and the boom in commercial building still is going strong. There will be stiffer competition for men, materials and equipment. Design and construction costs will rise. This is a good time, therefore, to take stock and make new plans.

First, what kind of buildings is industry getting? Are they structurally different from those built 5, 10, 15 or 20 years ago? With lighting standards upgraded, how is the demand for better illumination being met? With the pressure on for noise abatement, and many new firms specializing in acoustic treatment springing up, what effects are the new developments in noise control having on building design? With the need for electrical power on the increase, particularly as plants become more automatic, what can be done to keep industrial buildings from becoming obsolete too quickly? And with the growing concern for employee comfort, in addition to the necessity of meeting requirements of efficient production, what's next in indoor-climate control?

Furthermore, how big is the industrial building boom? Why did it happen? What factors are sustaining it and how long will it continue? What regions of the country are benefiting most? Where will industry build next, and what is influencing its decisions?

To answer these and other questions on the boom—shedding light on what is happening now and what the prospects are for the near future—ENR prepared the following report. In addition, since one way of killing the goose that lays the golden eggs is to throttle it with rising costs, major emphasis is placed in the report on how to give industry more for its building dollar—how to build better, faster, cheaper.

What Are Industry's New Buildings Like? **38**
35 Ways to Cut Building Costs **46**
Lighting Developments Promise Bright Future **62**
New Levels in Noise Control **74**
Power Systems Advance With the Boom **84**
New Ways to Heat and Cool **94**
Here's Where the Boom Is Heading **103**

●●●●●●●●●●●➡

What Are Industry's

How do today's industrial buildings compare with those built in the post-war period? Are they constructed to higher standards, or is quality being sacrificed in favor of quantity in the current boom? Are there any new design trends?

What type of firms are designing industrial buildings—architects, architects-engineers, consulting civil engineers or consulting mechanical engineers? Or is industry using its own staff for design? Are many of the plants being designed by builders?

To find out, ENR interviewed a large number of building designers, contractors and owners. Here are questions that were asked and the answers:

Better Windowless walls are preferred for production areas in controlled-conditions plants, but windows for offices. This type of construction was used for Utica Mohawk

How does column spacing compare with that used 5, 10, 15 and 20 years ago?

In most parts of the country, the trend is to wider spacing.

Where bays of about 40 ft or more became quite common for one-story buildings five to ten years ago, little or no change is reported. In other areas, column spacing is being brought gradually in line with this figure. However, designers report that more and more owners are asking for bigger unobstructed floor areas, because machines are getting larger and because of the need for flexibility.

For example, Giffels & Vallet, Detroit architects-engineers, say there has been little change in the past ten years, but column spacing is definitely wider than that of 15 or 20 years ago. However, the growth of automation and the trend toward installation of more expensive production equipment decrease the importance of the unit cost of an industrial building and encourage wider column spacing when it contributes to greater efficiency of operation. This firm also notes no changes in bay sizes for storage and office areas.

In contrast, Jack M. Corgan, Dallas architect, reports a definite trend in his area to wider spacing compared to what was used ten years ago. He says that 50-ft bays are now in general use, where appropriate.

C. W. Williams & Associates, Baltimore, also note the same trend. This firm says that 20 years ago, 24x24 ft was considered large; five years ago, it was 25x30 ft; and today, 30x40 ft is the average. Fruin Colnon Contracting Corp., St. Louis, finds the same conditions in its region. In contrast, Hogan Bros., general contractors, Metairie, La., report a reversal of the trend in its area: After the war, before construction costs soared, a large percentage of buildings constructed were of long-span (100-ft) steel arch construction. Now, most are flat-roof, short-span (30 to 40-ft bays).

Brooklawn Construction Co., engineers-constructors, Hartford, Conn., says: "Our procedure is to set up an optimum condition of 50-ft column spacing, and changes from this dimension are either based on production planning or owner's desires. Five years ago, we usually held to 30 and 40-ft spacings. The immediate post World War II period was about the same as now. Construction during the defense buildup pre-World War II appears to have been based on approximate spacings of 30 ft per bay. During the depression era, bay spacings averaged between 20 and 24 ft."

Despite the pressure for wider spacing of columns, construction costs mount so rapidly with longer spans that further substantial progress in this direction may have to await development of more economical types of construction. Boratynski of Pereira and Luckman, warns: "Those who dream of columnless buildings don't know their costs." He believes it wrong to try for wide column spacings just for a general desire for flexibility. Study what is going to go on, he recommends, have as many columns as possible without interfering with operations and get a cheaper building.

More and more clients, Robert & Co., Atlanta architects-engineers, report, are asking for column spacing approximating 40x60 ft, whereas 15

New Buildings Like?

Mills (above) Clemson, S. C. Designed by Lockwood Greene, New York, it is the largest one-story, air-conditioned textile plant in the world.

Faster Translucent plastic panels, put in place as speedily as ordinary light-gage metal roof deck, are replacing skylights in many new plants where daylighting is desired.

Cheaper Standardized buildings offer money-saving opportunities. For the 450x480-ft American Flyer Bicycle plant (above), Little Rock, Ark., 9 Butler Mfg. Co. 50-ft-span buildings were combined.

years ago, the same clients were satisfied with column spacings of about 20x25 ft. In many instances, however, the client changes his mind when he finds out the premium he is paying for spans in excess of 40 ft.

"We had one client," the firm relates, "who insisted on no columns in his plant and wanted a 300-ft width. Since we had designed such spans for large aircraft plants, we advised the owner of the cost of steel framing for a 300-ft span. It developed that the cost of the framing was exactly the amount he wanted to pay for the entire building. He quickly, therefore, accepted a column spacing of 20x28 ft, and was happy ever-after."

Apparently, though, with the type of framing in use today, the added cost for spans up to 60 ft is no great deterrent. "Recently," says A. Epstein, Chicago consulting engineer, "we compared the cost of an industrial building having 20x40-ft column spacing with 40x60-ft spacing. The extra cost for the wider spacing was only about 17 to 18 cents per sq ft. Consequently, the owner chose the larger spacing for better operation and more efficient storage."

A Westinghouse Electric Corp. engineer agrees: "Our experience is that the wider spacing costs very little more, if any, than closer spacing, due to the decrease in number of column footings." Westinghouse's present standard bay is 40x60 ft. It has been in use for six or seven years.

Is the trend toward one-story or multistory buildings?

Designers report a continuing trend toward one-story structures for prduction and storage areas and toward two stories for factory office buildings.

One-story buildings are preferred for production space because industry believes that straight, horizontal production lines generally are most efficient. But the nature of the product and manufacturing process must be considered, as well as the types of materials-handling equipment to be used. Sometimes, land costs play a role; for example, when a plant must be erected in a builtup section of a city, in which case a multistory building might be more economical.

Nicholas Boratynski, of Pereira and Luckman, Los Angeles, argues that the building should fit the product: "Small products can be assembled as easily on the fourth floor as on the first. You may want to have your stock on the first floor, move it up, or vice versa, and two floors may make good sense."

Albert F. Roller, San Francisco architect, agrees: "For a factory producing heavy materials, the trend today is toward one-story buildings. For light tote-box production—where hundreds of manufactured items can be carried in a tote box—it doesn't make any difference, provided that flow lines are properly worked out. Raw materials must flow smoothly into the manufacturing areas and back to the shipping department, which is always on the ground floor. Storage areas should be on the ground floor because incoming raw materials, even for light production, are always heavy."

Don Becket, of Welton Becket and Associates, Los Angeles, calls attention to the desirability of fitting building design to production needs. A bread plant his firm designed, for example, is multistory, because flour is gravity-fed from the second story down to mixing machines on the first floor.

Gerald Shannon, of Walter Kidde Constructors, Inc., Houston, considers one-story storage buildings advisable but believes mezzanine storage areas may also be useful, if accessible to high-lift fork trucks.

Most designers report that office sections of factories are generally two stories high and frequently separate production facilities. Shannon points out that a two-story office section usually is the same height as the production building and so can be fitted into the same structure. Robert & Co., Atlanta, add that the two-story design simplifies communications. Roller contends office space should be in a separate building because of odors, noise and the possibility of the offices blocking the flow line.

How do clear heights compare with those used in the past?

There has been a big increase within the last ten years.

The consensus of designers is that clear height (distance from floor to ceiling or underside of exposed structural members) in industrial buildings has been increased at least one-third in the last five to ten years. However, some designers believe that there may be a reversal of the trend with growing use of air conditioning.

There is no standard height, except perhaps for factory office buildings, where distance from floor to ceiling is generally about 9 ft. In fact, operations within a plant may demand various heights in the same structure, Smith, Hinchman & Grylls, Detroit architects-engineers, point out. The conclusion that clear heights are greater today than a few years ago is based on the observation that machines are getting larger, more overhead equipment is being used and minimum clear heights—in areas where equipment or storage requirements do not govern—generally are greater than in the past.

Shannon summarizes the principal items determining clear height above production equipment as follows:

1. Overhead space required for conveying systems and other materials-handling equipment.
2. Additional ceiling height needed for more efficient lighting and ventilation.
3. Additional ceiling height to permit flexibility in future re-arrangement of production facilities and to encourage a high resale value of the plant, if that is a possibility at a future date.
4. In storage areas, in addition, the height needed for pallet storage and materials-handling equipment.
5. In office and administrative areas, height may be governed by economy plus efficient arrangement of lighting, sprinklers and ductwork for heating and air conditioning.

Fruin Colnon, Inc., St. Louis engineers-constructors, add to these items allowances for future mezzanines. Also to be considered is the effect of automation, which in many cases calls for up and down movements, requiring space overhead or below the floor. This firm observes that many plants today require a clear height of 20 ft or more; 16 ft is normal in the average plant and is considerably greater than heights employed 15 years ago.

C. W. Williams & Associates also note an upward trend: Five years ago, clear heights ranged, as a rule, from 12 to 14 ft. Today, they range from 16 to 19 ft.

Many firms in different parts of the country agree that 16 ft is about the minimum today. But some report heights as low as 12 ft, though still pointing out that this is an improvement over heights used in the past.

Ward Hughes, of David W. Godat and Associates, New Orleans—and Robert & Co.—call attention to the limitations placed on this trend by air conditioning. Says the latter: "We believe that ceiling heights in plants are being lowered rather than raised, for the simple reason that more and more plants are being equipped with air conditioning. The minimum ceiling height is an important factor in the economy of design for an air-conditioned plant, since the more air you have to move the more expensive the air-conditioning system becomes."

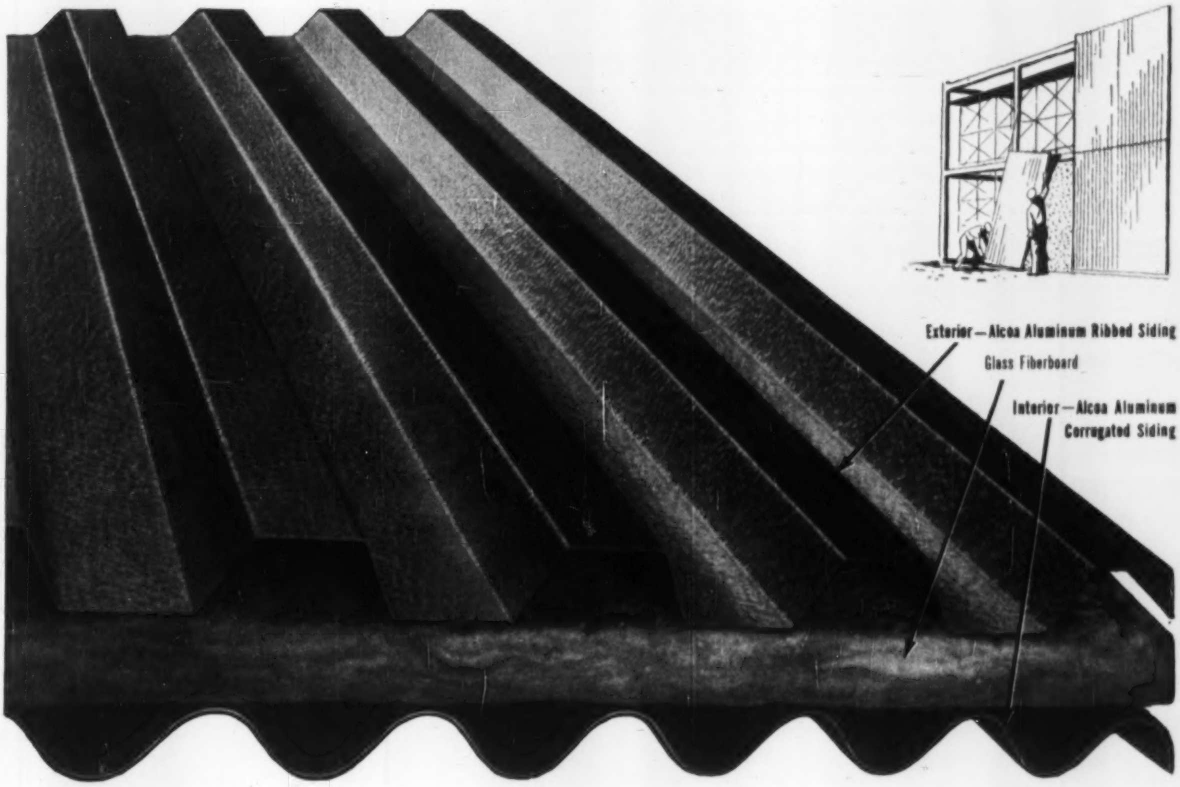
What are the prospects for wall construction?

Designers and contractors foresee less brick, glass and cast-in-place concrete, more metal and asbestos-cement.

In industrial construction, cost appears to be the governing consideration in deciding on what type of wall to use. Everybody likes brick, but the consensus is that less will be used in the future because it costs too much. However, there does not appear to be a suitable substitute with a pleasing enough initial cost in place. Aluminum facings, most designers and contractors believe, have the brightest prospect because of the possibility of less maintenance.

The viewpoint of designers is perhaps best expressed by Robert & Co.: "In our opinion, the type of material to use in exterior-wall construction is dependent on its appearance, cost and effectiveness in reducing heat losses or heat gains. There are many acceptable materials for wall construction. It is not uncommon for us to prepare complete cost estimates for five or six types of wall construction and give the owner the opportunity to decide which one he wants. Each type has a different price per square foot, and unless the owner has a decided preference for a particular material, he will accept the low-cost wall every time.

"There is a desire on the part of clients to find a wall type that is economical and time-saving in construction. This requirement is finding a place for tiltup concrete walls, concrete sandwich construction, asbestos-cement panels, metal panels, etc. As soon as an acceptable panel meeting all the conditions is available, it will probably be adopted; it will have to be as economical and durable as masonry is at present. We are trying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With Alcoa Aluminum Industrial Building Products, you can erect walls with a .155 U factor . . . equivalent to three times the insulation value of an 8-inch masonry wall. And the cost can be as low as $1.11 per square foot (averages about $1.35).

These walls consist of two sheets of Alcoa Aluminum sandwiching a 1-inch board of glass fiber insulation. Weldable studs can be used to fasten curtain walls to purlins or girts.

Field-erected, these insulated walls go up faster, with less man power and at lower cost than masonry. Their light weight helps reduce construction costs for steelwork and foundations. They never need painting. Industrial fumes can't hurt them. They're mighty good looking.

If you plan to cool these buildings, you have another important advantage: aluminum's high reflectivity helps keep the inside temperature lower. This means lower cooling costs. In winter, it means lower heating costs.

Alcoa will be glad to put you in touch with selected Alcoa Approved Applicators who offer a complete service in the erection of low-cost aluminum sandwich walls. Just contact the nearest Alcoa sales office, listed under "Aluminum" in your phone book. Or write Aluminum Company of America, 860-G Alcoa Building, Pittsburgh 19, Pa.

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them all, and it remains to be seen which one will merit universal use."

Here's how a general contractor—Raymond C. Daly, of the George A. Fuller Co., New York City—rates the prospects for wall materials:

- A general trend away from brick exterior walls.
- On the West Coast, a trend toward precast concrete walls.
- Good acceptance of sandwich panels, but they are mostly confined to office buildings.
- Good acceptance of corrugated asbestos-cement, principally for factories.
- Trend away from galvanized iron panels, primarily due to costs.
- Disinclination to use stainless steel because it is too expensive.
- Gain in use of corrugated aluminum.
- Restricted application of porcelain-enameled steel to sandwich panels in curtain-wall construction.

Daly can see no reason why any of these materials should dominate the market for the next decade.

Despite the belief that brick is expensive, designers will not completely avoid it. Says Smith, Hinchman & Grylls: "Future buildings probably will make much use of masonry to the bottom of the windows, with glass and panel construction above. Brick will never be obsolete."

Most designers expressed the opinion that there is a definite trend toward smaller windows. In particular, they see a trend toward windowless plants when air conditioning is installed. But this conclusion is disputed by the minority.

Becket argues that artificial lighting is better because it is more controllable than daylighting. "In a production area, artificial light is on all the time anyway, so why have windows?" he asks. "The same is generally true in storage and office areas. By leaving out windows, you save a lot in air conditioning and in the cost of glass. The only purpose of windows now is psychological. In a large production area, the value of windows for this purpose is minor, because many of the workers wouldn't see the windows anyway. In an office area, it's more important, but not too much so if the decor is pleasant and there are pleasant rest areas."

Sverdrup & Parcel, St. Louis engineers, add that omission of windows reduces drafts on workers from sash leakage and decreases maintenance. Roller calls attention to the advantages gained from increased security and less stealing; workers steal things by throwing them out the window to an accomplice or for later retrieval.

Those who see a different trend say that windows are necessary at least for psychological reasons. Smith, Hinchman & Grylls, citing Lever Bros.' Los Angeles plant and Ford's River Rouge plant, also call attention to the advertising value of a brightly lit office building in operation at night. Brooklawn Construction Co. contends that owners usually do not want windowless walls. This Connecticut firm also observes a trend toward monitor-type roofs to provide light and ventilation, which most designers in other areas believe are outmoded.

The H. K. Ferguson Co., Cleveland, Ohio, points to increasing use of translucent, corrugated plastic panels in walls instead of windows. And Fruin Colnon Contracting Corp. reports a similar increase of such panels in sloping roofs to admit daylight.

What's new in fire protection?

Some new trends are discernible but greater use of sprinklers is the chief one.

More use is being made of the old standby, sprinkler systems, than ever before, principally because of savings in fire insurance. But there are a few new developments.

Smith, Hinchman & Grylls call attention to a new type of sprinkler head introduced three years ago. A redesign of the deflector resulted in a wider angle and lower velocity of the discharge. About the same time, smoke venting and draft curtains were developed.

Smoke vents are louvers held in a closed position against spring tension by a fusible link. These vents are located on the roof of factories. About 1 sq ft of venting area is provided for each 100 sq ft of floor area.

Draft curtains are vertical barriers to the spread of fire. They are made of incombustible material suspended about 3 ft below the structural roof members. The barriers are usually placed so as to divide the building into sections with a floor area of about 100,000 sq ft each.

Sverdrup & Parcel point to a trend away from combustible roofs. Giffels & Vallet report replacement of combustible organic insulation on pipes and ducts with noncombustible inorganic materials, plus a trend toward local protection of hazardous processes with carbon-dioxide or foam.

Robert & Co. say use of steel furniture, steel partitions and noncombustible construction in small office buildings adjacent to large industrial plants is leading to omission of sprinklers.

Whitman, Requardt & Associates, Baltimore, report greater use of lightweight fire-proofing.

Do today's factories provide more or less space per worker?

Designers say square feet of floor area per worker is increasing. Exact figures are not available. Too much depends on the size of machinery used.

The conclusion that new plants provide more space per worker is an estimate in which most designers concur.

The consensus also is that space per unit produced is decreasing, because designers are using space more prudently.

Becket bases his opinion on the trend toward fewer workers and more automatic production and handling equipment. Cabot-Cabot and Forbes, Boston, agree with this and add that faster materials handling and better use of storage facilities also tend to increase space per worker. And A. Epstein, of A. Epstein & Sons, Inc., Chicago, calls attention to the need for wider aisles for mobile equipment.

Trends concluded on next page.

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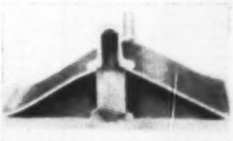

Cutaway section shows how SETLOK cap makes weathertight seal. When cap is driven onto stud, serrations firmly grip the aluminum.

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Who designs buildings for industry?

ARCHITECTS-
ENGINEERS
IS
WHO

Architect-engineer firms are used most frequently, owner survey shows.

The architect-engineer is the type of organization called on most often to design new plants. Industry's own engineering departments take second place.

Only half of 81 industrial companies studied use a single organization, the rest employ a variety of combinations. The frequency with which each type of organization appears in these combinations is shown in an accompanying table.

Most frequently, industry uses its own engineering department in combination with an architect-engineer firm.

Each of the following combinations are employed by a firm that handles most building through its own engineering department:

Architects and architects-engineers to help on peak loads

Architects for secondary work

Its own engineering department for 75% of the work; architects-engineers for 20%; mechanical engineering consultants for 5%, and sometimes, engineers-constructors to handle both design and construction

Its own engineering department for 80% of the work; architects-engineers for 10% and mechanical engineering consultants for 10%

Its own engineering department for the layout; then turns the rest of the design and construction over to an engineer-constructor

Its own engineering department for the complete design criteria, but architects-engineers and civil engineers for detail and working drawings.

How Manufacturers Handle New Plant Construction

This percent of manufacturers . . .	. . . use these organizations for entire job	And this percent of manufacturers . . .	. . . use two or more of these
	DESIGN		**DESIGN**
22	architects-engineers	40	architects-engineers
11	own engineering department	42	own engineering department
9	architects	17	architects
6	engineer-constructors	19	engineer-constructors
1	civil engineers	9	civil engineers
0	mechanical engineers	15	mechanical engineers
	CONSTRUCTION		**CONSTRUCTION**
36	general contractors	33	general contractors
19	separate contractors	21	separate contractors
6	engineer-constructors	17	engineer-constructors
0	own forces	16	own forces
1	lease-backs	0	lease-backs

• Other trends in industrial building

The firms interviewed also called attention to several other trends. For example, Cram & Ferguson, Boston architects, noted the emphasis now being placed on working conditions and other facilities that foster good employee relations; provision of adequate parking space for employees and visitors; location of truck loading and unloading areas under cover; and incorporation of air-conditioned office space in warehouses.

Also reported is a continued trend to concrete floors with hardened surface in most production and storage areas, wood block being used where a resilient floor is desired. Asphalt tile or plastic tile is preferred by most designers for office floors.

Summing up, here's how new industrial buildings differ from those built in the past:

- Mostly one-story.
- More floor area per worker.
- Wider column spacing.
- Greater clear height.
- Less unit masonry in outer walls.
- More reliance on sprinklers for fire protection.
- Better working conditions for employees.
- Less glass in walls and roofs.

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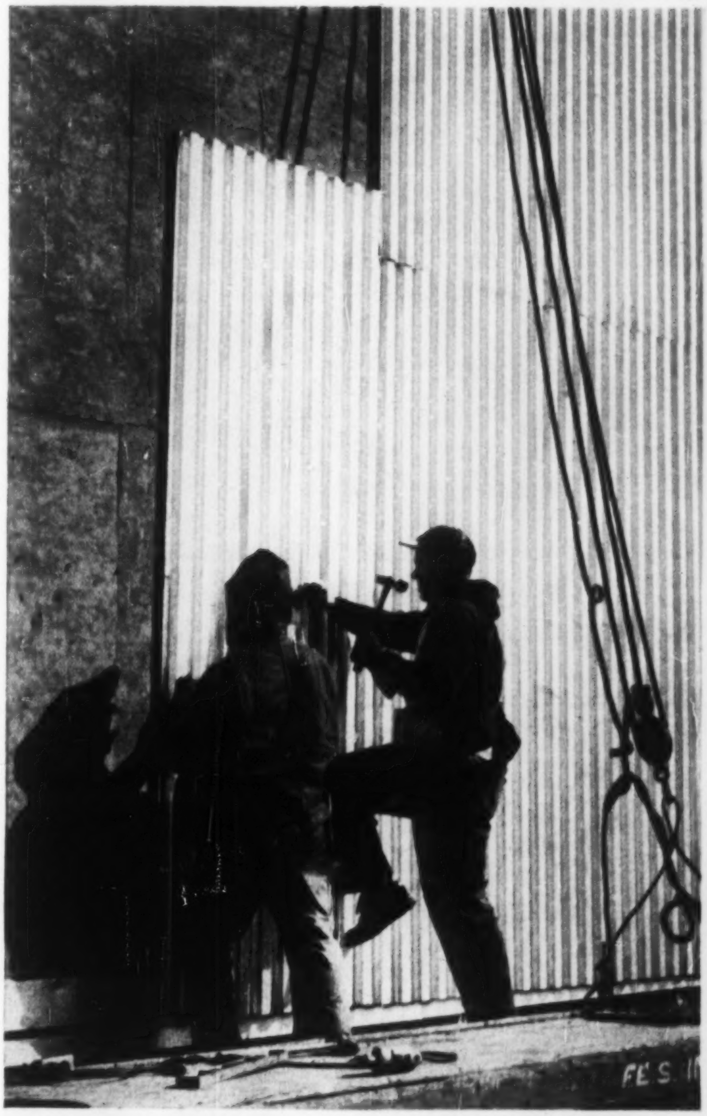

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DESIGN FLEXIBILITY—Standard Fiberglas PF Insulation and standard aluminum sheets are used. You get a custom-tailored building without paying for custom-tailored materials.

Advantages like these make the Fiberglas insulated aluminum sandwich wall perfectly suited for commercial and industrial buildings—for plants and warehouses of all types. For full details on this high-performance, low-cost wall, write today to Owens-Corning Fiberglas Corporation, Dept. 145G-5, Toledo 1, Ohio.

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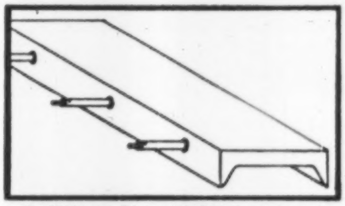
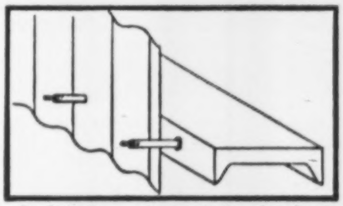
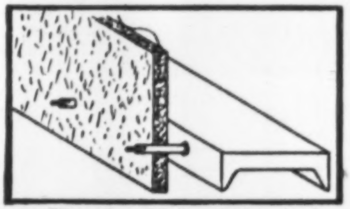


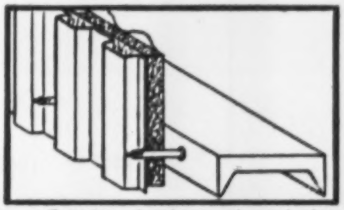
1 Nelson Rivweld Studs are automatically end welded to girts and purlins.



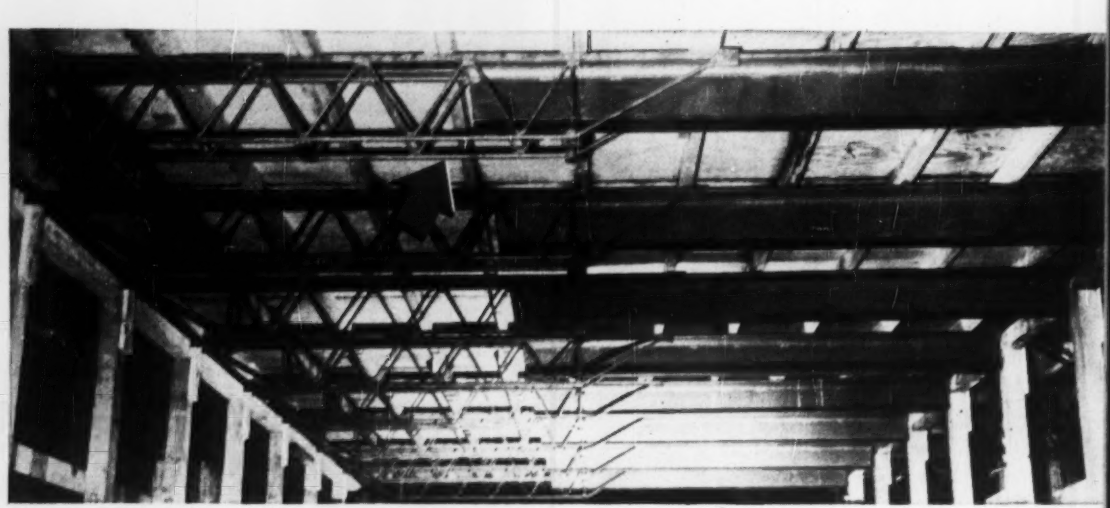
2 Interior corrugated aluminum sheet is impaled over major diameter of stud.



3 Fiberglas PF Insulation is impaled over stud extension and nested firmly against interior sheet.



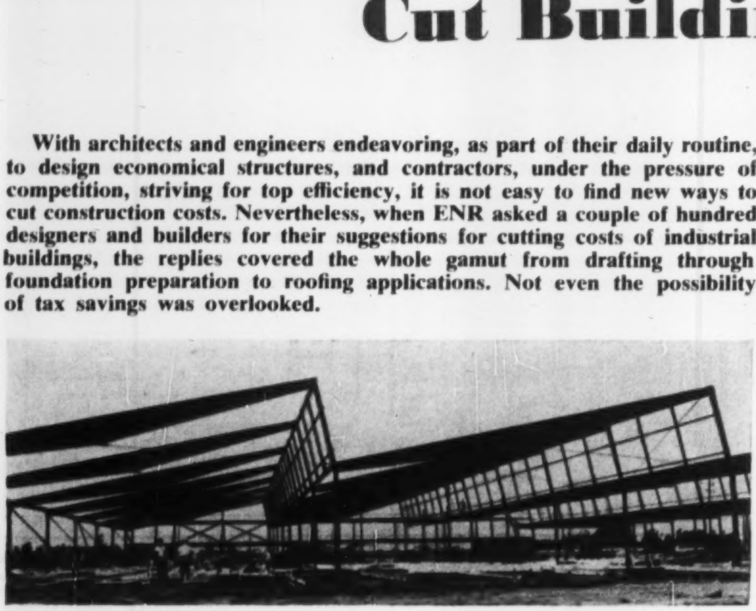
4 Exterior aluminum sheet is impaled over stud extension and secured with SETLOK cap.



Better Supporting forms for concrete floors and roofs on girders eliminates a forest of shoring. Carl Buhr, Inc., general contractor, New York City, employed patented, adjustable-length horizontal shoring on a 14-ft span to support forms for an 8½-in. slab in a Swift & Co. plant, Kearny, N. J. This construction simplified falsework, minimized obstruction of floors below and made stripping forms easy.

35 Ways to Cut Building Costs

With architects and engineers endeavoring, as part of their daily routine, to design economical structures, and contractors, under the pressure of competition, striving for top efficiency, it is not easy to find new ways to cut construction costs. Nevertheless, when ENR asked a couple of hundred designers and builders for their suggestions for cutting costs of industrial buildings, the replies covered the whole gamut from drafting through foundation preparation to roofing applications. Not even the possibility of tax savings was overlooked.

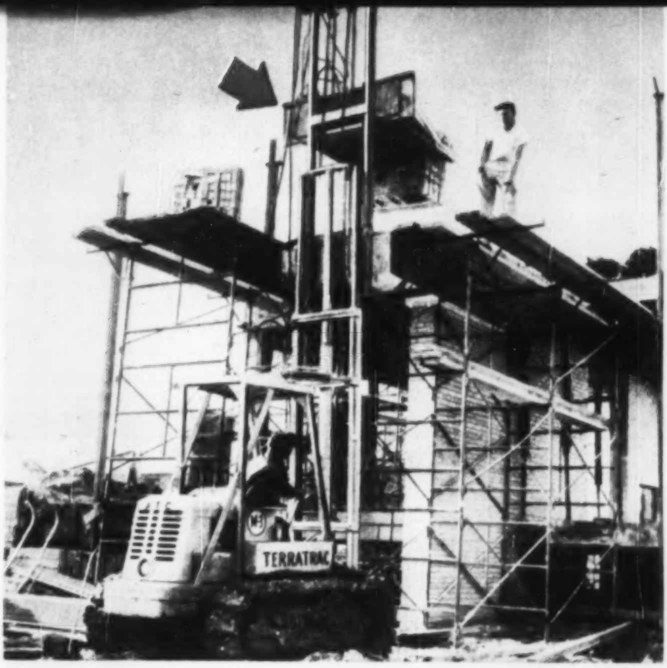


1. Shape Steel Beams to Stress Pattern

It makes just as good sense to taper simply supported beams as it does to haunch continuous beams, putting the deepest section where it is most needed and eliminating unneeded material. Richard R. Bradshaw, Los Angeles structural engineer, used tapered steel girders to advantage for the Minneapolis-Honeywell Regulator Co. plant in Gardena, Calif. The webs are formed by cutting wide plates on a diagonal, then rotating and splicing them to obtain the greatest depth at midspan. (See "Welded Tapered Girders," American Institute of Steel Construction.)

2. Run Ducts Through Beams

In air-conditioned buildings, headroom can be saved by using open-web structural framing, which permits ducts to pass through. One way to achieve this objective is to employ open-web steel joists. When heavier, solid-web members are required, Van Rensselaer P. Saxe, Baltimore consulting engineer, suggests cutting openings for ducts in the webs, which can often be done without an increase in beam size.



Faster Palletizing materials and delivering them with mobile lifting equipment speeds construction. V. S. Wallgren Co., Chicago contractor, handles brick in this fashion. Gladding Bros., San Jose, Calif., changed the shape of its drain tile from round to hexagonal for palletizing.

Cheaper Drilled-caisson method of constructing column footings effects economies by eliminating compacted backfill, hand excavation, forming and stripping.

3. Try Standardized Buildings

Some manufacturers produce standardized parts that can be combined in many ways to form buildings. Cost in place of such structures is claimed to be as low as $2 per sq ft. Some types are frameless; some are steel rigid-frame construction, and some, truss-and-column construction. Spans range up to about 120 ft and lengths are almost unlimited. High-bay structures are available with the crane rail heights up to 25 ft. The bigger the building, the lower the cost. A 250,000-sq ft plant (right) for Sarkes Tarzian, Inc., at Bloomington, Ind., was erected in 92 days with components fabricated by Stran-Steel Corp., Detroit, for only $2.80 per sq ft—estimated to be 38% less than for a custom-built structure. In the 1,030x138-ft low-cost warehouse (left) built for the Louisville and Nashville Railroad in Nashville, of parts made by Armco Drainage and Metal Products, Inc., Middletown, Ohio, plastic skylights are interchangeable with steel roof panels.

4. Make Slabs Work With Beams

Much lighter beam sections can be used if some of the bending stresses can be taken by concrete floor or roof slabs. With composite construction, however, provision must be made to assure shear transfer between slab and beam. (Some investigators claim taking care of vertical shear is more important than horizontal shear and require ties to prevent the beam from pulling downward away from the slab.) Angles, spiral wire or studs can be welded to the top flange of steel beams for the purpose. With precast concrete, bent bars can be left projecting from beam tops and tied to dowels

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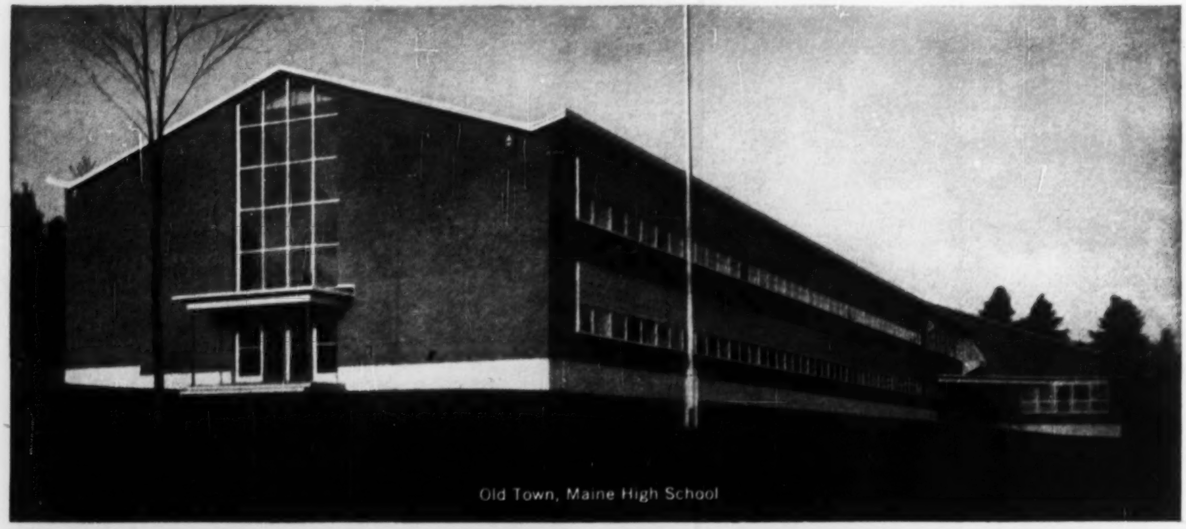

Old Town, Maine High School

Interior of Gymnasium wing

Interior of Home Economics section

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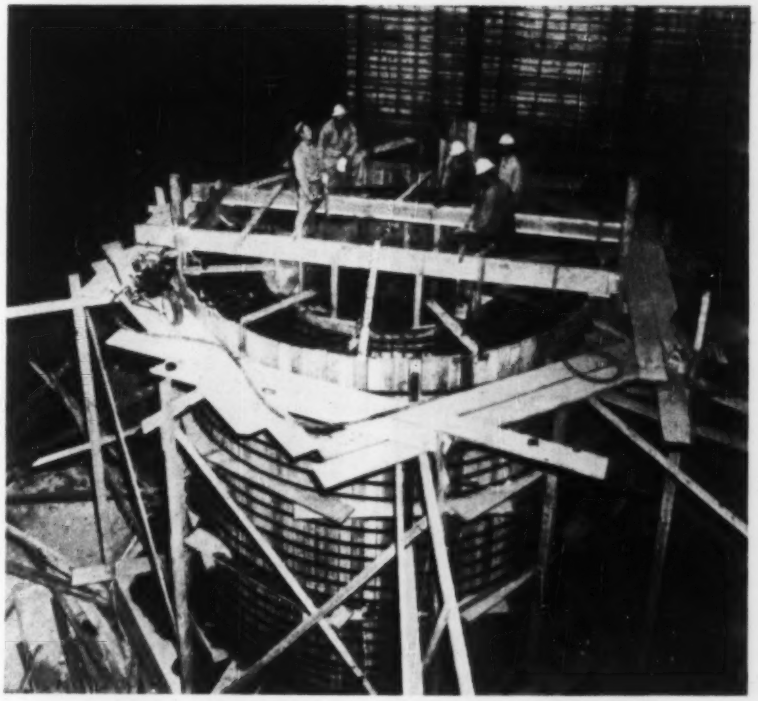
. . . How to cut costs

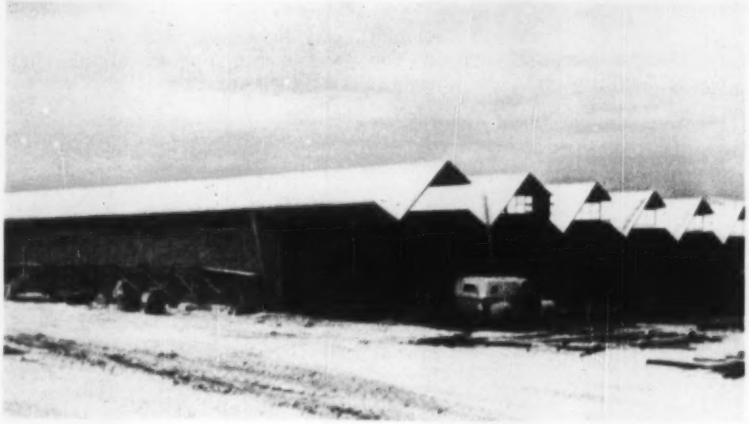
from ends of decking by welding or with cast-in-place concrete.

Similarly, prestressed concrete can be made to work with reinforced concrete. One method is to use prestressed, precast concrete only for the tension flanges of beams and cast-in-place concrete for the remainder of the beams and the slabs.

5. Brace Forms ▸ With Steel Straps

Heavy-duty steel strapping, instead of wood bracing, wrapped around the forms for an 18-ft dia anode-furnace hub saved 3½ days, 15 man-days. Olson Construction Co., Salt Lake City, made a continuous pour for the full 24-ft height, yet found expansion of the form well within the ¼ in. allowable. Net saving is estimated to have been $900.





6. Span Big Bays With Thin-Shell Concrete

Concrete roofs of folded-plate construction only 4 or 6 in. thick span 75 and 85 ft in the H. W. Moore Equipment Co. factory building, Denver. In effect, the thin slabs, designed by Milo S. Ketchum, Denver consulting engineer, act as deep, tilted girders. Farkas & Barron, New York engineers, report receiving low estimates on hyperbolic-paraboloid shells.

7. Save Drafting Time With Photos

The H. K. Ferguson Co., Cleveland, is using photo-drafting with excellent results. This technique involves addition or subtraction of detail from a photographic overlay. The method eliminates the necessity of drawing or re-drawing existing plant facilities. For an expansion of a large processing plant, where construction could not interfere with operations, Ferguson had to install piping and equipment in precise sequence, each item being executed during sharply limited periods. Normally, elaborate drawings would have been made, many job meetings held and several practice runs made to familiarize the workmen with the task. Much of this cost and effort was eliminated with a photo-drafting system in which pictures of existing installations were accompanied by successive step-by-step overlays. Parco Co., New York industrial design consultants, uses a technique it developed in which drawings are replaced by photographs on which dimensions and other notes are incorporated (ENR March 24, 1955, p. 47). It is particularly advantageous for complicated industrial construction.

8. Mechanize Builtup Roofing

Several contractors have cut costs by speeding up applications of builtup roofing with mechanized materials handling. Roofing rolls are carried to roof level by portable conveyors, and asphalt is pumped up, then distributed with powered buggies. Machines also are being used successfully for laying roofing felts. For the new-type roofing developed by Lexsuco, Inc., Cleveland, Ohio, which is claimed to give better protection against spread of fire, an applicator is available that coats the underside of the plastic vapor barrier with adhesive as the plastic unrolls. Then, the machine rolls and brushes the plastic on the roof deck and applies ribbons of adhesive for securing insulation board to the plastic.

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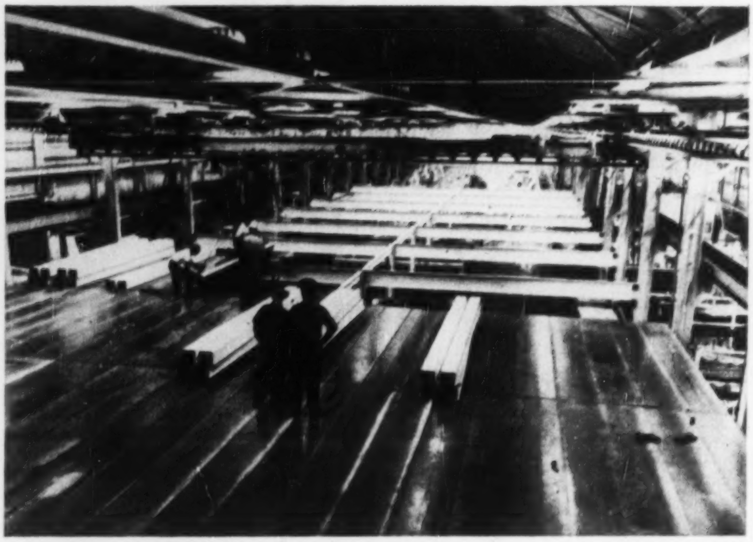
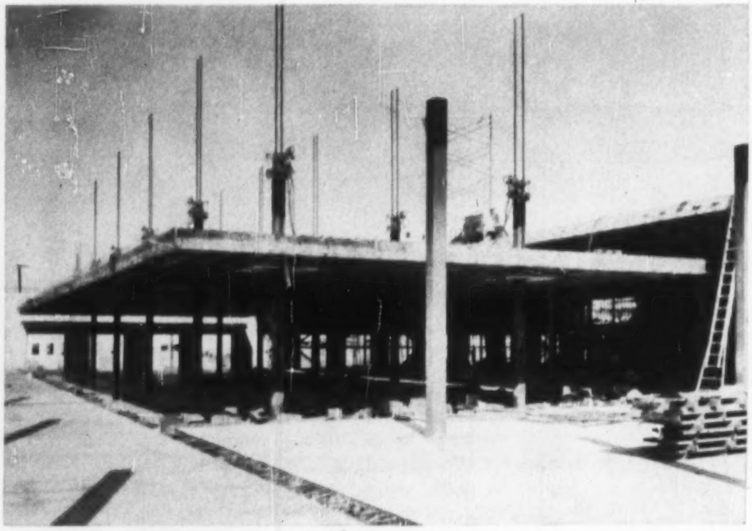


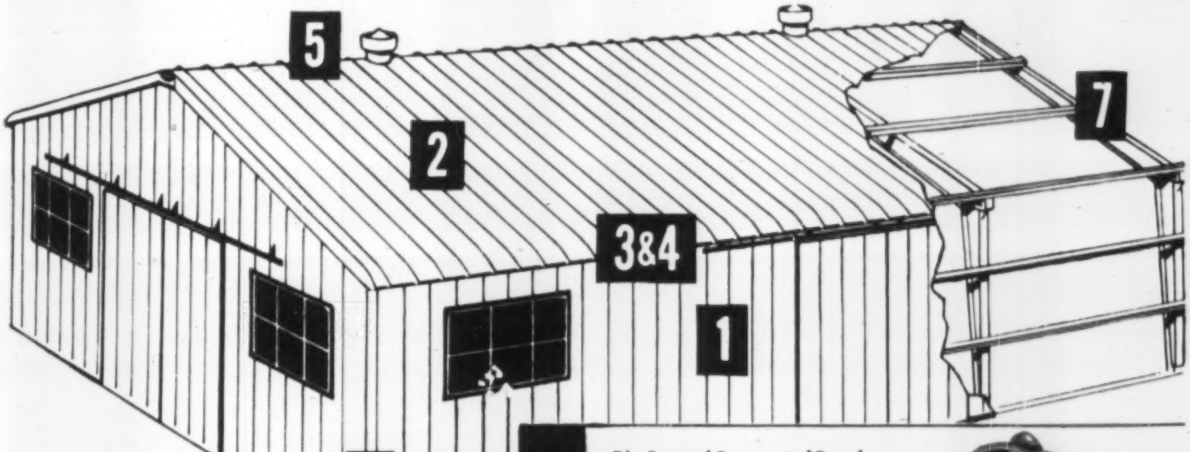
9. Add a Mezzanine to Gain Floor Area

Where headroom is available, inserting a mezzanine may be the answer to an expansion problem. Van Dyke & Barnes, Los Angeles architects, worked out just such a solution for Douglas Aircraft Co. at its Torrance, Calif., plant, with a cellular steel floor. Only one row of columns had to be added. When the loads are light, existing steel framing can be used to support the new floor. In that case, light decks, such as cellular steel and open grating are advantageous in keeping weight down.



10. Cut Weight of Lift-Slabs

Hollowing a concrete floor or roof to be erected by the lift-slab method is one way of cutting costs, since the reduced weight permits the same equipment to lift bigger slabs. For the Brea Corp. warehouse in Los Angeles, the lift-slab, designed for a 200-psf live load, with columns 24 ft c-c, was cast on corrugated paper boxes about 18 in. square, which gave the under side a waffle-like appearance. The joists thus formed are 15 in. deep and the top slab is 3½ in. thick. Columns are hollow, square steel sections. Other techniques used for cuttin weight include embedment of cylindrical paper forms, use of lightweight aggregate and prestressing.



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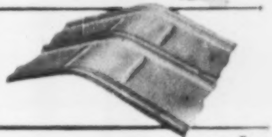

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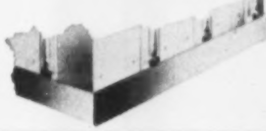

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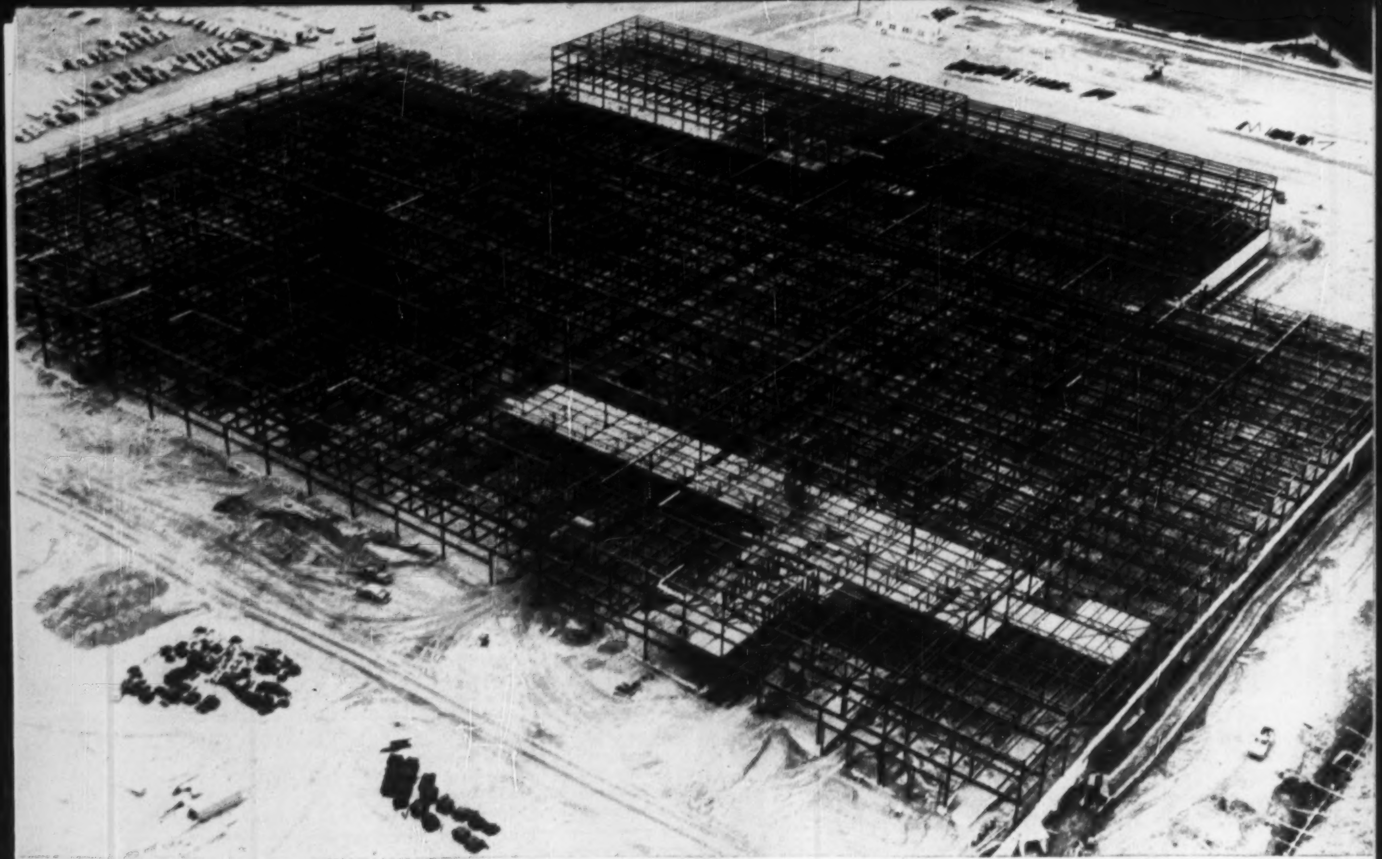

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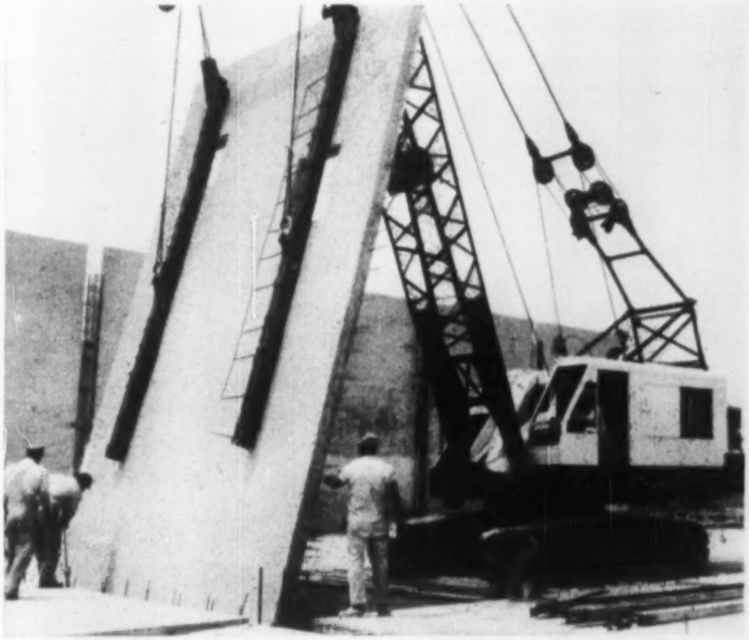
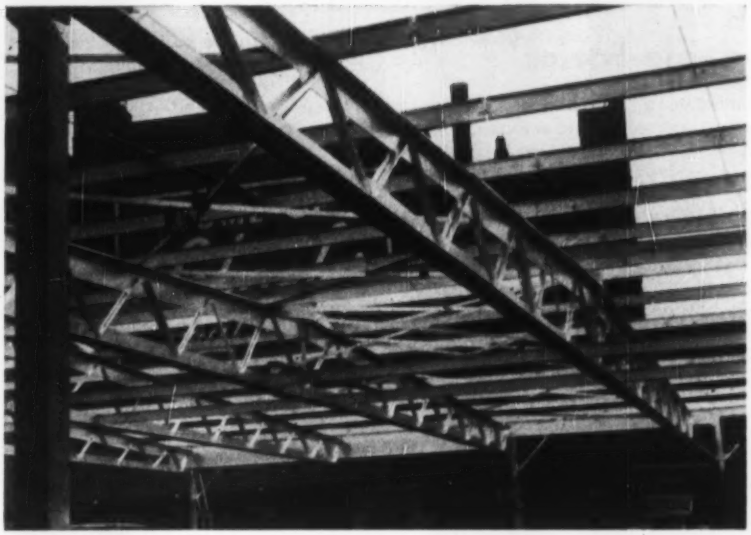
11. Tiltup Walls ▸ To Speed Erection

Precast concrete walls and roof deck and prestressed, precast girders were key elements enabling erection in 100 calendar days of a 97,400-sq ft warehouse in Houston. Yet, the building, which will permit bulk storage of rice to a height of 16 ft, cost only $4 per sq ft. Linbeck Construction Corp., the general contractor cast the exterior walls on the concrete floor and tilted them into position with a crane. Designed to take the thrust of the piled rice, the wire-mesh reinforced concrete panels are 18½ ft wide by 26 ft high, and 8 in. thick for the first 16 ft, 6 in. thick above. They weigh 25 tons apiece. Prestressed roof girders, fabricated by Rackle Co. of Texas, span 60 ft.



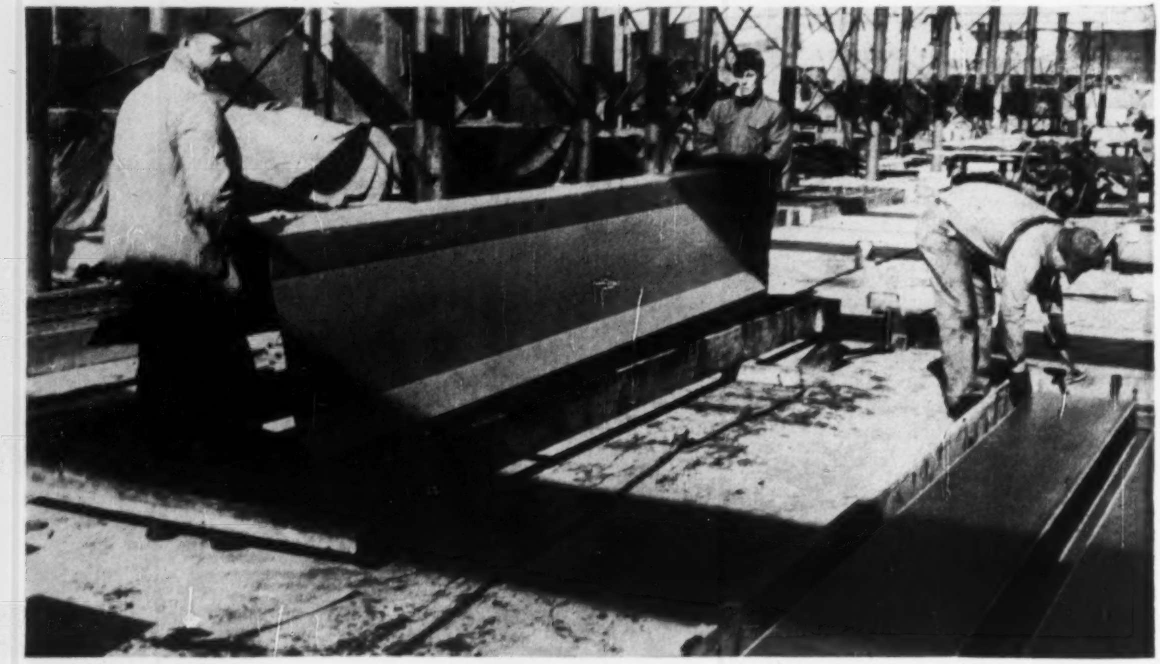


◂ 12. Fabricate Trusses by Welding

Welded trusses proved economical for supporting a shed roof on a 120-ft span for F. & M. Schaefer Brewing Co. in Brooklyn, N. Y., where depth of structural members was limited. Seelye, Stevenson, Value & Knecht, New York consulting engineers, able to use a maximum depth at the center of only 1/20th the span, called for T-shape chords made by splitting a 30 WF 190 beam down the middle. To connect angle web members to the chords by riveting or bolting was out of the question because of the limited depth. Welding turned out to be the best solution.

13. Shoot Fasteners Into Place ▸

Quick way to attach aluminum roof deck to steel purlins is to fire a steel pin through the sheet metal with a powder-actuated tool and tighten an aluminum cap nut on the stud. This newly developed fastening arrangement is said to preclude galvanic corrosion between steel and aluminum. These powder-actuated tools can also drive fasteners into concrete and wood.



14. Use Cheap, Expendable Forms

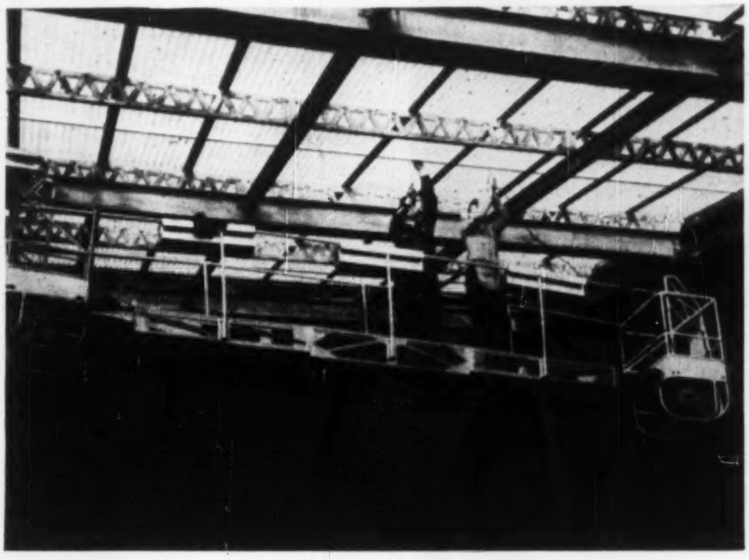
Prefabricated forms inexpensive enough to be thrown away after one use may prove a big cost saver under the right circumstances. Huber, Hunt & Nichols, Indianapolis contractors, cut labor costs 66% for forming precast roof panels for a 25,000-sq ft building in Crawfordsville, Ind., by using corrugated fiberboard forms mass-produced by Inland Container Corp., Indianapolis. Cost of the form material is claimed to be comparable with that of other materials that might have been used. On this job, the number of identical pieces —350 units—was large enough to make practical the necessary tooling up for mass production. Also, the design of the 18x4-ft roof panels was such that complex wood forms would have been required. The forms are light, easy to handle, accurately fabricated and easy to strip. Cleaning and repairing costs are eliminated.

15. Make Precast Beams Continuous

Continuity can be established easily for precast, prestressed beams, improving their economy. A technique used effectively by Ross Bryan, Nashville consulting engineer, is to place reinforcing bars on top of beams at supports and encase the beam ends and bars in cast-in-place concrete. Prestressed block beams spanning 33 ft in the roof of a one-story warehouse built for the Air Force at Shelby, Ohio, were made continuous under live loads in this manner.

16. Mechanize Material Handling

Construction can be speeded and costs cut by several different techniques for bringing materials quickly to the point of application. One way, used by the Austin Co., Cleveland, Ohio, for a Sears-Roebuck store in Youngstown, is to construct a ramp to the upper floors or roof for use of lift-trucks transporting palletized materials. Another method is to employ trucks with a high lift or use portable conveyors. And still another, applicable for liquids, such as asphalt, concrete or gypsum, is to pump the material into place.



17. Hang Staging for High Work

For work on or close to the roof of a high bay, staging hung from the roof structure may be extremely advantageous. On one job, installation of plastic skylights from inside the building was facilitated by an easily moved, suspended platform supplied by Spider Staging Sales Co., Renton, Wash. Basic unit is a one-man cage, which is power driven both up and down. It can be moved horizontally in 3-ft steps by shifting its weight alternately from a wire rope to a transfer chain and back. The rope and chain are hooked onto clamps placed on overhead structural members. The unit can also roll along a structural member. For the skylight installation, two units were connected with an adjustable platform, spanning a full bay, and rolled along the top chords of roof trusses.

18. Prefabricate Window Walls

For exteriors with extensive glass areas, the walls and windows may be placed faster and costs cut by using standardized, story-high, prefabricated units. Pereira & Luckman, Los Angeles architects-engineers, say they saved $0.20 per sq ft and about two months in construction time in this way on window walls for Northrop Aircraft's engineering building in Hawthorne, Calif. The units include spandrel, sash and adjustable louvers. At the job site, they need only attachment to the building frame and installation of glass. Two-story units also are available.

19. Try Form Liner for Better Finish

In seeking a way to eliminate unsightly marks and embedded dirt from the inside surface of tiltup concrete wall slabs, the Flagler Co., contractor, Atlanta, Ga., experimented with polyethylene sheets as form lining and was pleasantly surprised by the results. Rolfe Edmonson, assistant superintendent, who used the technique for a Simmons Co. factory in Jacksonville, Fla., reports that the ease with which the precast concrete panels can be separated from the forms prevents damage when stripping. He is particularly pleased with the smooth finish obtained on the concrete, which is especially desirable for the exterior surface.

20. Spray Paint on Roof Steel

Cost of painting the exposed structural steel supporting the roof of the Ford Motor Co. plant in Cleveland, Ohio, was slashed by spraying from the ground. The job was done using a 20-ft extension rod on the sprayer. But in some areas, the painters' union will not permit spray painting.

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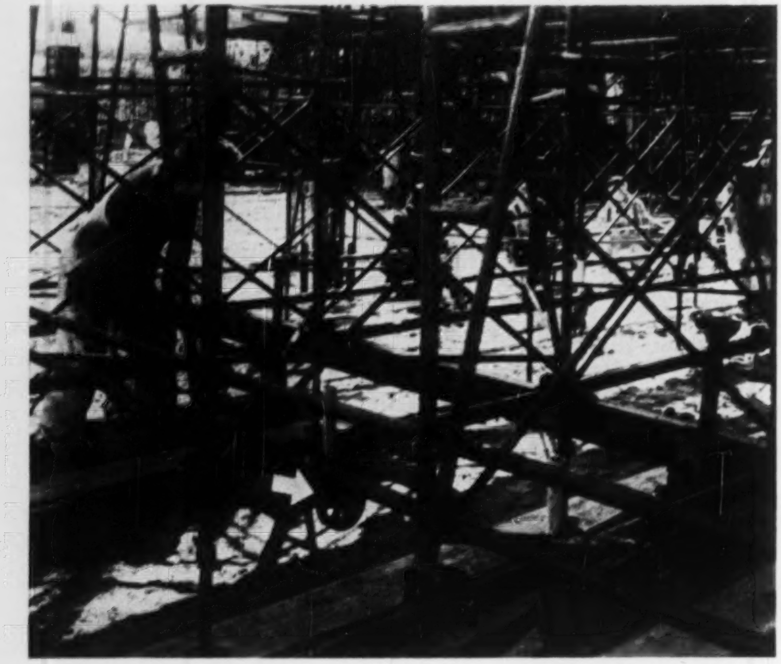

21. Put Form Supports on Wheels

When forms can be re-used several times on the same structure, labor may be saved by carrying them on portable supports. Rolling tubular scaffolding, developed by the Austin Co. and Universal Manufacturing Corp., enabled Austin to use the same plywood forms five times and cut labor expense in erecting and stripping forms for the second floor and roof of the Sears-Roebuck store in Youngstown, Ohio. Screw jacks at the base of the steel scaffolding raised and lowered it.

22. Clip Insulation on Roofs

Moving into the U. S. from Canada is a new technique for fastening insulation speedily to fluted steel roof deck without many of the limitations of present methods. Developed by Dominion Fasteners, Ltd., Hamilton, Ont., a clip made of spring steel is held against the edge of insulation board and wedged in a flute of the deck with the aid of a special tool and a few hammer blows. It does not pierce the sheet metal and leaves no sharp protrusions that might cause injuries.

23. Dewater Concrete in Winter

Fred A. Clear, district superintendent, The Austin Co., Cleveland, recommends use of vacuum concrete in cold weather, when there is a big advantage in removing excess water rapidly from the mix. He says he has been able to start preliminary finishing one-half hour after placing and leveling concrete. In midwinter tests run by Austin, vacuum concrete developed 3,500 psi in less than one week, with concrete that was expected to develop only 3,000 psi in 28 days at 70F.

24. Eliminate Excess Space Under Roof

A good way to save money on construction is not to put any more space under roof than absolutely necessary. For example, International Salt's Chicago warehouse is shaped just like the pile of salt it was designed to shelter. It sloping roof matches the angle of repose of the average salt pile. Two-hinged, trussed wood arches that support the roof span the 149-ft width of the building and have a rise of 70 ft.

25. Standardize Components

"What counts in reducing costs," remarks Neal J. Campbell, St. Louis consulting engineer, "is the ability to put standard package units into a job and get duplication all the way through." He put this principle to work on the design of the $2 million Brown Shoe Co. warehouse in St. Louis and saved about one-half million dollars. Only three sizes of windows were used; formwork for the flat-slab waffle floors was laid out for many re-uses; concrete columns were cast in mass produced paper forms; and exterior walls consist of field-assembled, aluminum-and-steel sandwich panels, with insulation and gypsum board core, capable of meeting St. Louis fire-code requirements.

26. Use "Jumbo" Brick

David Elwell, of Lockwood Greene, New York architects-engineers, says construction of masonry walls can be speeded, and costs therefore cut, by using oversize brick. This size brick is particularly advantageous for windowless walls. Additional economy can be achieved by supporting structural framing on the masonry, omitting steel wall columns. For one-story buildings, walls can be laid to roof level and floors concreted during the steel fabrication period, rather than letting the job stand idle after completion of foundations while waiting for steel. Using this method, Lockwood Greene erected a plant in the South with over 500,000 sq ft of floor area—from inception of the project to machinery installation—in only seven months.

27. Start Windows Higher

When the owner insists on windows, the floor area near them need not be lost. The windows can be started high enough above the floor to allow machinery to be placed close to the wall. Anderson-Nichols, Boston architects-engineers, applied this technique to economic advantage in the Standard Tool Co. plant at Leominster, Mass. Glass was started 7 ft 6 in. above the floor, so that all floor area is available for production. Walls to sill height are brick and cinder block. Above the glass, an insulated sandwich of corrugated aluminum and asbestos-cement is used.

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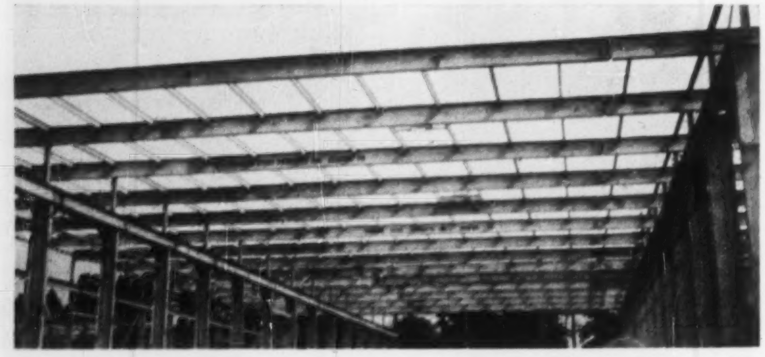


28. Weld and Make Beams Continuous

Continuous steel beams and welded connections brought in a low bid for the structural framing of a warehouse for A. M. Castle & Co., Baltimore, $26 per ton less than for riveted trusses. The building has 50, 85 and 70-ft crane bays. Van Rensselaer P. Saxe, consulting structural engineer, Baltimore, spanned these bays with 30-in. deep, wide-flange beams of different weights, which he made continuous over stub H-columns seated on the crane columns. Crane girders also rest on these columns, eliminating the need for supporting them on brackets. The welded design called for 16% less steel and cut framing costs 28%.

29. Make Materials Do Several Jobs

You can almost get something for nothing if you use a material that serves several purposes. Fairchild Engine and Airplane Corp. got a relatively inexpensive roof deck for its Deer Park, N. Y., plant by using Tectum, a precast concrete panel made with wood-fiber aggregate. This material was chosen because it not only served as a roof desk but also as an acoustical and thermal-insulating material. Similarly, for the Magill-Weinsheimer plant in Lincolnwood, Ill., glass-fiber board was used three ways in the roof—form board for cast-in-place gypsum, thermal insulation and acoustic treatment for the working areas below.

30. Anchor With Welded Studs

Instead of hand welding anchors to structural angles for attachment to concrete, try end welded studs. Applying them with a welding gun, Midwest Iron Works, Inc., Chicago, reports cost savings of 35% to 50%. The method is much faster than hand welding and minimizes distortion.

31. Lay Floors With Road Paver

Before the building frame was erected, the concrete floor for National Homes' 265,000-sq ft plant in Tyler, Texas, was put speedily in place. L. H. Lacy Co. laid 50,000 sq ft per day with a road paver. This technique was partly responsible for keeping the cost of the plant down to $3.58 per sq ft and enabling it to be finished in six months. If contraction joints are desired, they can be cut in later with a power saw.

32. Go Underground

Noting that earthmoving costs have not risen as fast as those for other construction operations, Frank Whitney, vice president, H. K. Ferguson Co., recommends use of basements to gain space. For example, he finds it cheaper to put heating equipment in a basement than in roof trusses, particularly where overhead clearances are affected by the equipment. Lily Tulip Cup Co. put its service lines in large tunnels under floors of its one-story plants at Augusta, Ga., and Springfield, Mo. At the latter plant, 3,660 lin ft of tunnel, containing 400,000 cu ft, with concrete walls and steel beams to support the plant floor, cost $225,000, or $0.56 per cu ft.

33. Use Siding Fillers

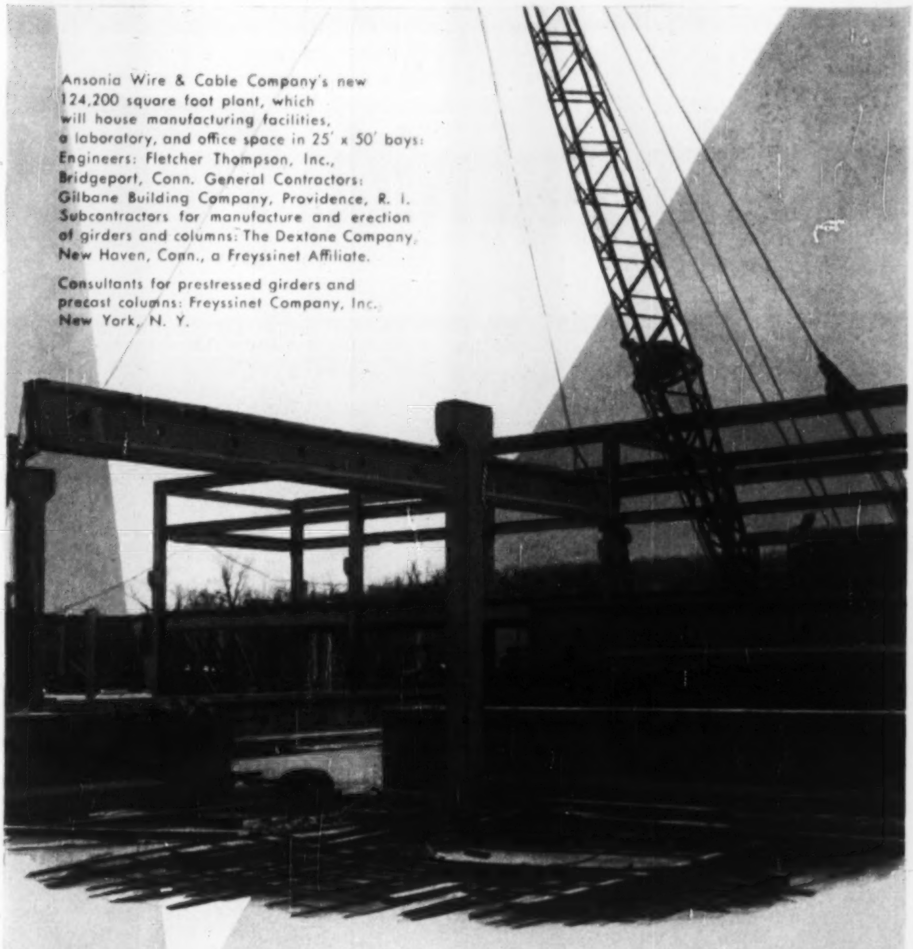
Irregularly shaped siding for industrial buildings presents a problem in making wall construction weathertight. One efficient solution is to use preformed filler, or closure, strips to close the openings at the ends of corrugated, V-beam and ribbed panels. This technique was adopted for the aluminum roofing and siding enclosing the 11-acre U. S. Army warehouse in Palmdale, Calif. The strips are available generally in asphalt or rubber and can be quickly fastened in place with nails or adhesive. One company alone, the Asphalt Corporation of America, Danville, Ill., makes more than 70 differently shaped strips.

34. Check Tax Situation

Frank Whitney, vice president, H. K. Ferguson Co., offers several suggestions for cutting costs through tax savings: (1) Find a defense angle (basement bomb shelter, for example) to get a faster writeoff of depreciation for tax purposes. (2) Omission of walls not only cuts construction costs but may put the structure in a lower tax bracket because it then can be classified as a platform, rather than a building. (3) Cost of engineering changes before and during construction can be classified as operational cost and is entitled to a tax reduction.

35. Use Limit-Load Design

More economical structural framing will result if design is based on ultimate strength, with an appropriate safety factor. The latest revision of the American Concrete Institute Building Code recommends ultimate-strength design procedures for reinforced concrete. The American Institute of Steel Construction is now preparing recommendations for structural steel.



Ansonia Wire & Cable Company's new 124,200 square foot plant, which will house manufacturing facilities, a laboratory, and office space in 25' x 50' bays: Engineers: Fletcher Thompson, Inc., Bridgeport, Conn. General Contractors: Gilbane Building Company, Providence, R. I. Subcontractors for manufacture and erection of girders and columns: The Dextone Company, New Haven, Conn., a Freyssinet Affiliate.

Consultants for prestressed girders and precast columns: Freyssinet Company, Inc. New York, N. Y.

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- 50' prestressed concrete girders with 6" holes provided for present and future service lines. These girders were standard Freyssinet I-Beams.
- girders and precast columns were designed to carry a two-ton concentrated load in addition to the metal deck and ordinary roof loading.
- girders met 5,000 psi specifications and columns 3,750 psi.
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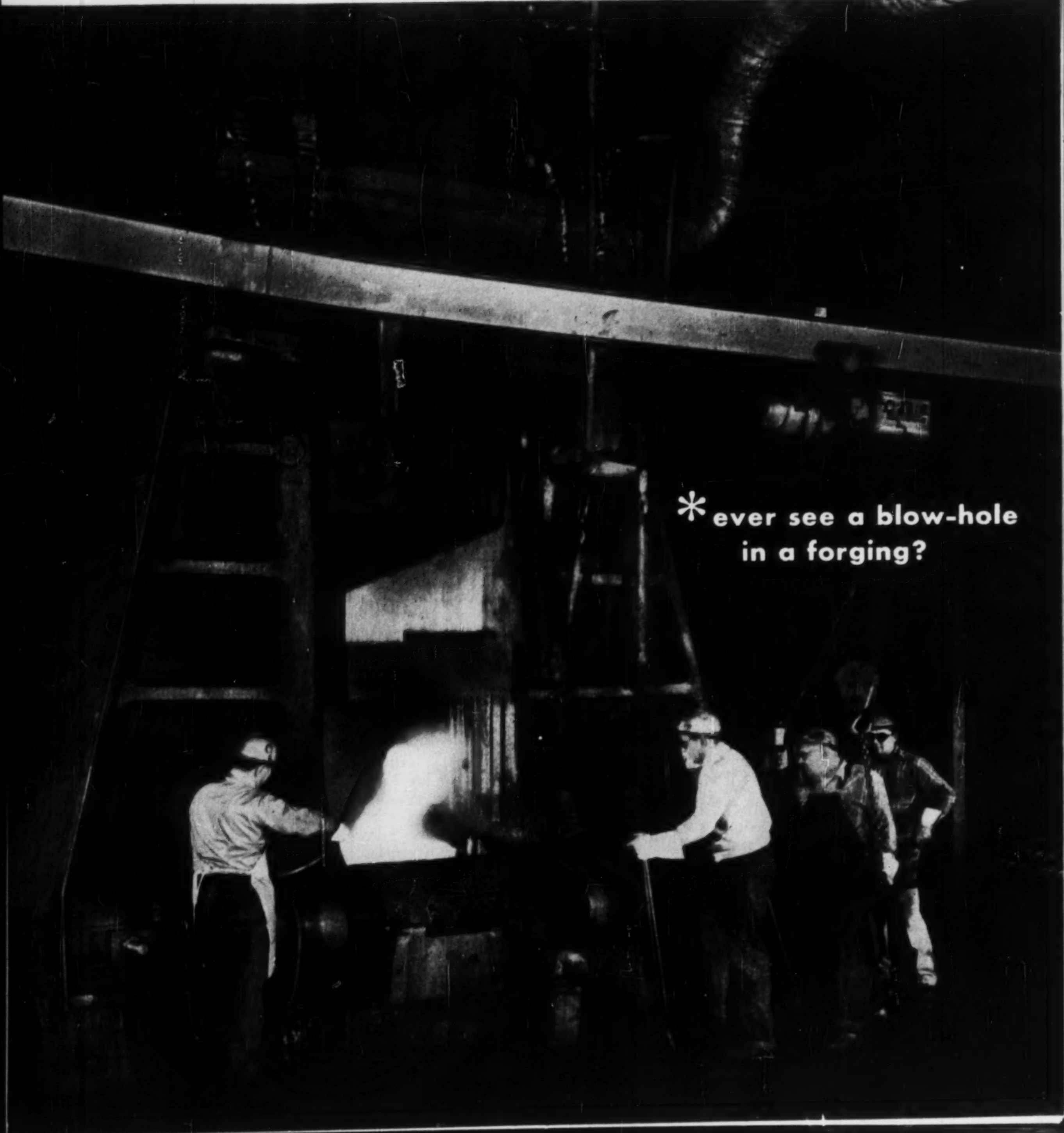
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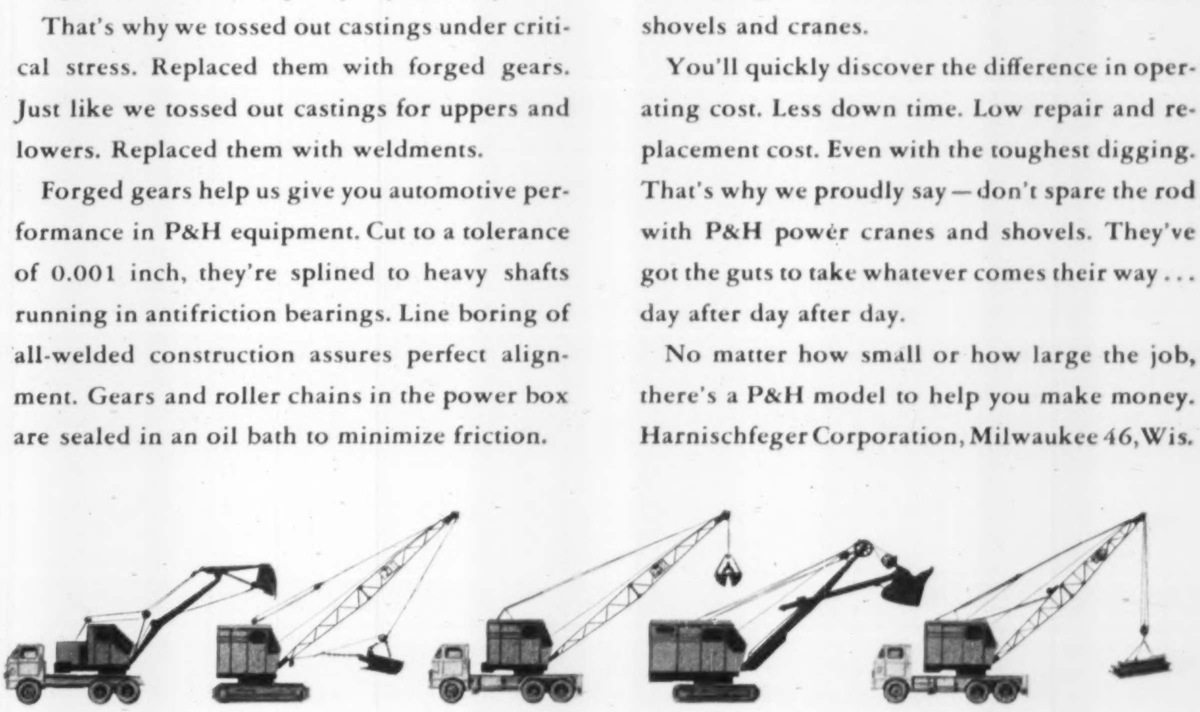

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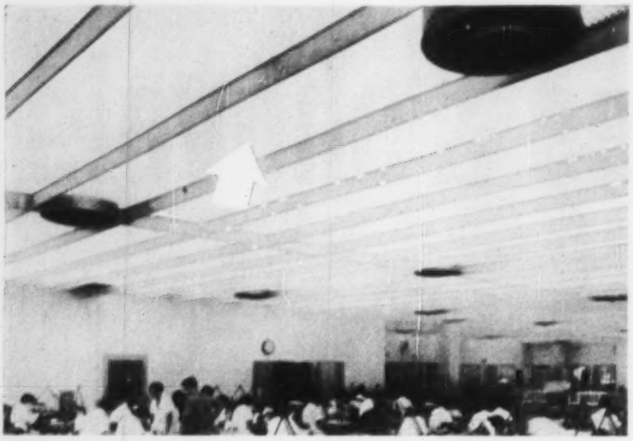
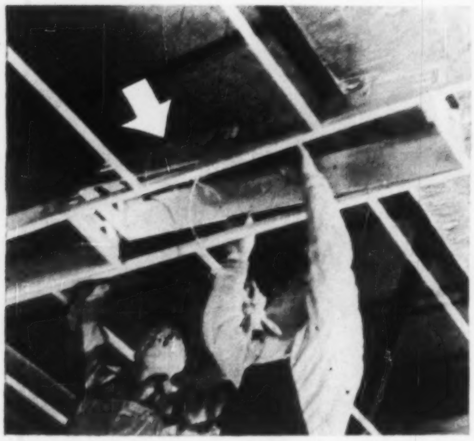


Better Trans-lighted ceiling gives uniform illumination over production area. For Davis & Geck, Inc., Danbury, Conn., it provides 80 ft-c of general lighting. In addition, acoustical baffles reduce noise.



Faster Aluminum parabolic reflectors slip rapidly into place in framework of hung ceiling.

Lighting Developments Promise Bright Future

More light for less money—better quality too—that is what industry wants today. And builders and planners are striving to give industry these, with a big assist from lamp and fixture manufacturers who are working tirelessly to increase the output of present light sources. At the same time, new products and concepts are entering the lighting field.

Incandescent, mercury vapor and fluorescent lamp types comprise industry's three basic illumination sources, and new developments are pushing each forward:

- For incandescents, a stand-up filament has upped lamp efficiency as much as 15%.
- For mercury vapor lamps, a phosphor coating on the inside of lamps corrects the bluish-green illumination. Latest color-corrected mercury lamps even exceed the efficiency of older conventional types.
- For fluorescents, General Electric's new power-groove series, to be available in the fall, will have double the light output of present tubes with no loss in efficiency.

Also on the lighting horizon are new types and concepts. High-frequency lighting promises big increases in lamp efficiency. But a drawback is the converters needed to obtain the high-frequency, and maintenance is a problem too.

Newest development, still in the experimental stage, is electro-luminescence. Light is produced by phosphor powders coated on a glass or metal panel and energized by an external electric field. Important feature is that it frees lighting for the first time from its conventional glass envelope. Panels can be any size or shape. So far, efficiencies of the new light source are too low to be practical—only 2%.

• Planning a plant for lighting—Good lighting in industry pays off in a host of benefits. By cutting down employee eyestrain and fatigue, better production is achieved. The more alert employee works safer, detects flaws more easily. There are fewer mistakes.

It has taken time for industry to learn this lesson. Twenty-five years ago recommended industrial lighting intensities were below 10 ft-c. Today lighting intensities—depending on the task—vary from 30 to 100 ft-c for most production areas. This figure is climbing, say illuminating engineers, who predict intensities of 100 to 200 ft-c for future industrial buildings.

Lighting intensity is but one of the factors to be considered in planning for lighting. Equally important is the quality of light as determined by the type of lamp and fixture (luminaire), the color and reflection factor of walls and ceiling, and the shape of the room. If there is a particularly critical seeing task, supplementary lighting may be required in addition to the general lighting level.

Planned maintenance is a key item in considering any prospective lighting system. Industry has learned that unless lamp replacement is extremely easy and low-cost, it generally does not pay to wait until a lamp burns out before replacing it. Recommended by

Cheaper At Onsrud Machine Co., Niles, Ill., reflector-type, 750-watt incandescents were combined with 400-watt mercury lamps. Economy results from the high efficiency of the mercury lamps; safety against power interruption is assured by the incandescents.

many engineers is group replacement, where all lamps are replaced at one time when they reach a certain stage in their expected life. One scheme is to replace all lamps when they obtain 80% life expectancy. Then, set aside the best 20% of these and use them for replacements during the next re-lamping round.

Light output depends directly on the reflection and color characteristics of the fixture, the room and its contents. For this reason an important consideration in planning lighting maintenance is establishing a program for cleaning and painting the building and cleaning lamp fixtures.

In industry, the chief cause of light loss is dirt on lamps and fixtures. To eliminate dirt, most fixtures used today are vented. The convecting air currents passing upward over the bulb carry dirt particles out through the vents.

For programmed cleaning and replacement, many schemes are used, depending on the plant. Among these are telescoping scaffolds, catwalks and lamp changers. Many plants are using a lift truck with an elevating platform on it.

• High vs low-bay lighting—Industrial lamps and fixtures are generally classified in two categories—those for low-bay plants; and those for high-bay. Low-bay plants are those where the height from floor to roof framing is less than 30 ft. In this category will be found the light manufacturing and assembly industries, packing, shipping and chemical plants. Buildings where the roof framing is 30 ft or more above the floor are defined as high-bay. This includes plants for fabricating heavy equipment, plants with overhead cranes, such as foundries, steel mills, and ship fabricating plants.

Often, low-bay plants involve the use of production-line conveyors, or routing a product from one process to another. Where such production is found, a localized system of lighting can be designed for, with substantial savings in both initial and operating costs. Here, the major portion of available light is directed to the work, the remainder to the nonproductive areas. More frequently, however, the exact plant layout is not known ahead of time, or a flexible lighting system is desired. In this case, a general lighting system would be employed.

High-bay plants are frequently characterized by large and heavy machinery. Such machinery because of its height will interfere with light that is inclined at more than 30 deg to the vertical. For this case, intensive distributions of light will put more light to work than will diffused systems.

• Who designs lighting systems?—The plant engineer or architect-engineer who designs the building generally plans the lighting unless a specialist is needed, in which case he would call in an illuminating engineer. Many architects-engineers turn for help to local electric power companies. In many areas, such companies are happy to lend a consultant to help solve a plant's lighting problems.

• Meet the old timer—Still widely used in industry today is the tungsten-filament incandescent lamp, descendant of Edison's carbon-filament first lamp. Advantage of the incandescent lamp is its low initial cost. A 100-watt coil-filament incandescent, producing 1,630 lumens, costs $0.22, as against a 25-watt fluorescent producing about the same amount (1,660 lumens) with an initial cost of $1.20. The 100-watt mercury lamp which produces about 1½ times as much light (2,300 lumens) lists at $11.25.

Other advantages are that incandescents are easy to install and maintain, start instantly and are free from stroboscopic effect. The incandescent is also more tolerant of variations in line voltage than its competitors. With deviations of over 5%, mercury vapor lamps go out.

Disadvantage of the incandescent is its lower efficiency. Most range from about 15 to 20 lpw (lumens per watt) whereas mercury vapor lamps range mostly from 40 to 60 lpw and fluorescents from 50 to 70 lpw. Another drawback is the incandescent is much shorter lived. Ordinary incandescents are designed to last 750 to 1,000 hours (mercury lamps last 6,000 to 7,000 hours, fluorescents 6,000 to 7,500 hours). Longer-life tungsten lamps can be purchased, but a compromise is involved; the longer the life, the less the efficiency. Where replacement is especially difficult, special lamps can be used that last up to 5,000 hours but at a heavy sacrifice in efficiency.

Incandescents are available as either standard or reflector-type. The latter is desirable where maintenance of reflector fixtures will be costly. For low-bay lighting, incandescents in up to 500-watt sizes are used; for high bays, higher watt (750, 1,000, and 1,500) sizes.

Still popular for some low-bay areas is the incandescent lamp in a shallow-dome fixture. Alan Wood Steel Co., Ivy Rock, Pa., used this scheme for lighting its low-bay power house. The building houses the giant electric motors used to drive the hot-strip mill. The roof had to be removable for motor maintenance and installation. For this reason, 200-watt incandescent-dome units were suspended from beams rather than the corrugated metal roof. Interspersed throughout the group of fixtures were similar units tied into an auxiliary circuit for emergency lighting.

Incandescents are also used in high-bay installations for stand-by emergency lighting, since mercury lamps will cut out with power interruption,

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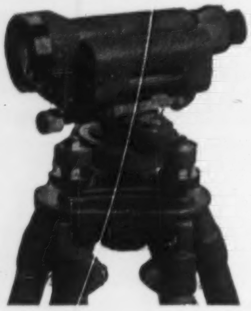

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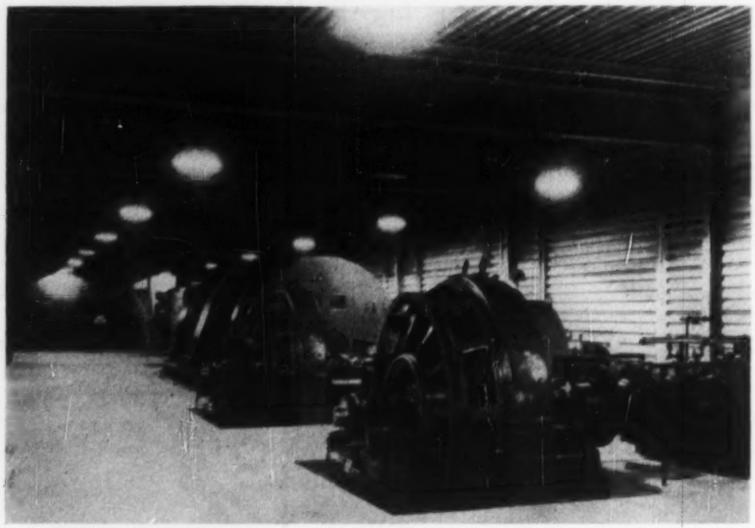

INCANDESCENT LAMPS in shallow-dome fixtures hung from beams light powerhouse of Alan Wood Steel Co., Ivy Rock, Pa.

require 4 to 8 minutes to warm up again. Stand-by incandescents start instantly, enabling production to begin immediately when power is resumed. The Chevrolet Stamping Plant, Flint, Mich., uses this scheme for its 35-ft high-bay, heavy-industry operation. Normal lighting requirements of 50 ft-c are met by 1,000-watt color-corrected (phosphor-coated) mercury lamps. For emergency lighting, 750-watt reflector-type incandescents are turned on.

Because of the savings it offers in maintenance, the reflector-type incandescent (or mercury) lamp is sometimes preferred. A reflector-type lamp consists of a standard or parabolic bulb, the inside of which has been coated with silver or aluminum to act as a built-in reflector. At the Dallas, Texas, plant of Chance Vought Aircraft, Inc., illumination was doubled without changing the power bill by merely substituting 750-watt reflector incandescents and 400-watt reflector-type mercury lamps for older 750-watt (non-reflector) bipost lamps and 400-watt standard mercury lamps. Illumination at the work level was raised from 18 to 36 ft-c. Yet, the only new equipment cost of the conversion was the small expense of installing new screw-type sockets in the old twin fixtures. The increase in illumination was attributed to three factors:

- Built-in reflectors direct light to specific work areas in the plant, reducing the amount of "spilled" light that escaped older-type external reflectors.
- Higher efficiency of the newer mercury lamps with quartz arc tubes.
- Improved maintenance because the reflector is built into the bulb and replaced when lamp is replaced. Also, little dirt can adhere to bulb face. With the older, external reflector types, 30% of the light was often lost at the light source.

Cost comparison for lighting Foster Wheeler Corp.'s $5 million factory at Wilkes-Barre, Pa. (ENR Nov. 26, 1953, p. 26), showed that reflector-type incandescents would be cheaper than ordinary mercury-vapor lamps. The main portion of the plant is a high bay area, 90 x 100 ft by 75 ft high, with 50-ft clearance under the cranes. Illumination of 30 ft-c over the entire work area is provided by 750-watt reflector-type incandescents mounted on the lower chord of the trusses 75 ft overhead.

• **Mercury lamps have high output**—The mercury vapor lamp is industry's favorite, particularly for high-bay lighting. Reasons are many. Foremost is its efficiency, ranging as high as 65 lpw. Combined with this is its long-life, up to 6,000 to 7,000 hours.

Big advantage of the mercury lamp over present day fluorescents is its higher output (a 96-in. high-output fluorescent gives off 7,250 lumens—largest fluorescent output marketed; mercury's largest, the 3,000-watt tube, has an initial light output of 132,000 lumens.) However, fluorescents have an edge over mercury vapor in efficiency.

Most mercury lamps are constructed with two bulbs. An inner bulb or arc tube contains the arc and an outer bulb protects the arc tube from changes in temperature.

Light from a conventional mercury lamp has a bluish-green color and is deficient in the red end of the spectrum. Today, mercury lamps are available that have this color deficiency corrected. Color-correction is

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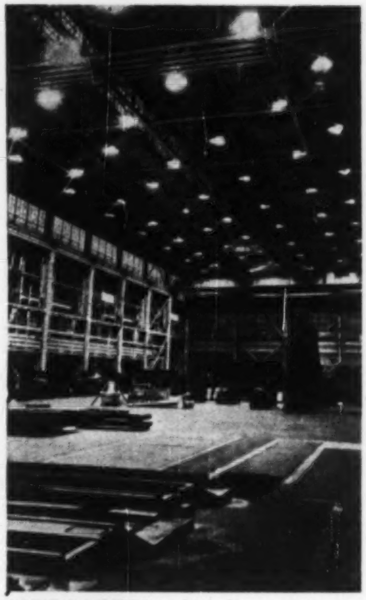

TRIPLE UNITS in high bay contain one incandescent, two mercury lamps.

achieved by coating the inside of the outer bulb with fluorescent materials. These convert some of the lamp's previously invisible ultra-violet rays into visible rays in the red end of the spectrum. Newest color-corrected lamps have efficiencies that even exceed those of conventional types.

Since color-corrected mercury lamps cost somewhat more than clear bulbs (a 400-watt corrected lamp lists at \$22.40 vs \$18.40 for conventional), color correction is often accomplished, instead, by combining a mercury lamp with an incandescent. This combination is particularly well suited for 40-ft or higher bays. Lamp sizes are calculated on the basis of the mercury handling 50 to 65% of the total lumen output.

A combination mercury-incandescent system solved the lighting problem economically for one turbine manufacturer in a high-bay plant, and at the same time it provided emergency lighting and color correction. Set at a 45-ft mounting height, twin, vented luminaires containing two 1,000-watt incandescent lamps were alternated with similar double fixtures that held 400-watt mercury lamps. Spaced at 14 ft along the axis of the plant, 20 ft transversely, the combined double fixture gave 45 ft-c at the working plane.

A more popular method of combining mercury-incandescent is to use twin luminaires in which are mounted one incandescent and one mercury lamp. One engine manufacturer did this to obtain 60 ft-c at the working plane. The twin luminaires have one 400-watt mercury lamp and one 750-watt incandescent.

Another practice is to alternate single incandescent and mercury units. Alan Wood Steel Co. uses this scheme for its rolling mill, where 400-watt mercury units and 750-watt incandescent units are alternated at a 42 ft mounting height.

Sometimes triple units are used. One factory in its 58-ft high-bay area employs a triple reflector luminaire with two 400-watt mercury lamps and one 1,000-watt incandescent. Illumination obtained is 75 to 80 ft-c.

Rather than combined mercury-incandescent systems, many manufacturers are leaning toward the frosted color-corrected mercury lamp. It solves lighting and color correction in one package. For its new tube mill, Bridgeport Brass Co., Bridgeport, Conn. installed 1,000-watt color-corrected mercury lamps in a 35-ft high-bay area. Lamps were mounted in ventilated fixtures set flush with the bottom chord of trusses. This practice of flush mounting luminaires with the bottom chord of trusses is often required to avoid interference with overhead cranes.

Since they require no fixtures, reflector-type models of color-corrected mercury lamps often solve what could be a difficult maintenance problem. Color-corrected 400-watt reflector-type mercury lamps were employed by Joseph T. Ryerson and Sons, Inc., to relight a warehousing area in Pittsburgh. Ryerson found there was no need for cleaning since very little dirt collected on the bulb faces.

A menace to the life of any lighting installation—particularly incandescent—is plant vibration. If severe, vibrations can materially decrease lamp life. One way to get around the problem is the solution used by Westinghouse Electric Appliance Di-

MERCURY LAMPS, 1000-watt color-corrected, set at 35 ft supply 50 ft-c.

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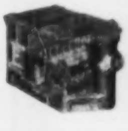

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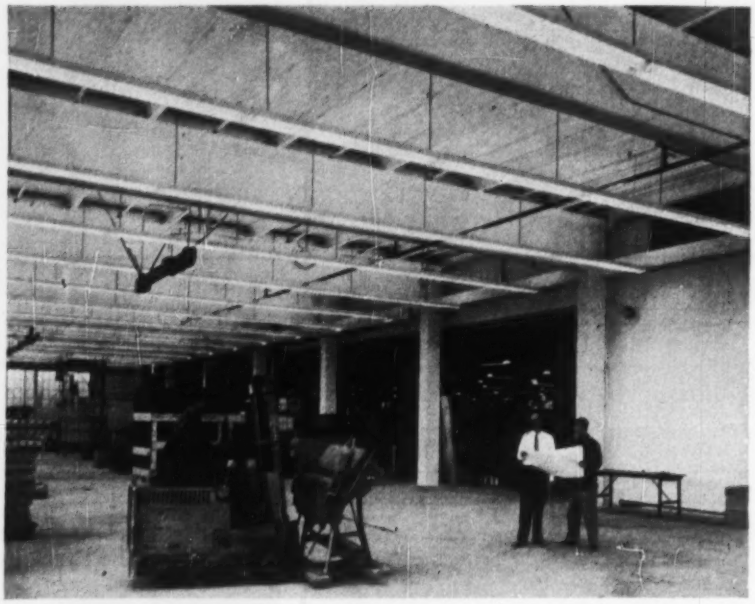

FLUORESCENT FIXTURES giving off nearly 50% uplight provide 60 ft-c in this light-painted plant. Units are mounted above 15 ft above the floor and set 9 ft c-c.

vision, Columbus, Ohio. Lighting fixtures are suspended by stems from outlet boxes on the ceiling. Spring ball and socket connections between the hanger stems and ceiling outlet boxes reduce effects of vibration on lamp life. Connections also guarantee plumb hanging of fixtures.

• **Enter the magic tube**—First introduced in the U. S. in 1938, the fluorescent tube wasn't long in being taken into industry's fold. Contributing to its popularity are its high efficiency and long life, and it does not have the color handicap of the mercury lamp.

In an effort to get higher efficiencies, better starting and more life, two new-type lamps have been developed—the slimline series and the rapid-start, high-output group. Most recent development is the power-groove lamp. It will be available in the fall, will offer double the light output without sacrificing efficiency.

First fluorescent fixtures were little more than sheet metal reflectors. Next step was to vent the reflectors. Then diffusing glass, egg crate and baffle systems were placed on the luminaire underside to minimize glare. Following this came today's trend to open top fixtures, which throws from 10 to 25% of the light upward. These eliminate the sharp contrasts of dark ceilings and light, bright work areas and makes factories easier places in which to work.

A typical fluorescent lamp has an electrode at each end of a slender tube. The tube is coated with phosphors and filled with mercury vapor. With the correct vapor pressure within the tube, the proper electrode temperature, and adequate voltage, a current will flow through the mercury vapor and generate light. Much of this light is invisible ultra-violet radiation, which the phosphor coating on the inside of the tube converts into visible light.

The standard fluorescent starting system, the one most widely in use today, is the preheat system first adopted with the original fluorescent lamp. This system relies on a bipin base to provide a momentary current flow through the filament for heating. The design makes possible smaller ballasts to lower open-circuit voltage. Its shortcoming is the brief time needed to function before the lamp lights.

Introduced in 1952, the newer rapid-start feature of fluorescent lamps is accomplished by a special cathode scheme coordinated with a ballast design which incorporates an auxiliary heating circuit through the filaments. It speeds up the starting interval and eliminates the separate starting switch.

The still newer slimline lamps are instant starting, depend on establishing a higher voltage between electrodes. Since no preheat circuit need be established, a single-pin base is all that is required for the lamp.

Data on the three lamp types (slimline, rapid start, general line) are available for a careful analysis of which will best suit a plant. Briefly, here is where the three types are best adapted:

- For tubes over 42 in. long where quick starting and maximum efficiency are desired, use the slimline type.
- For high output, with some loss

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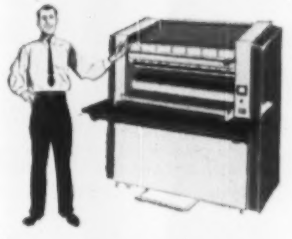

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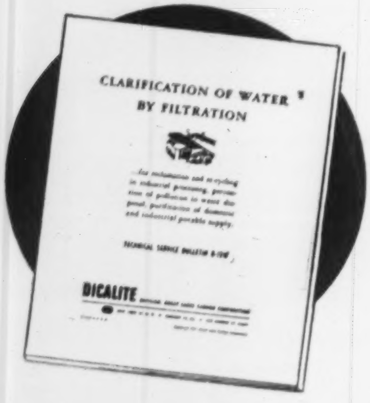

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in efficiency, above 48 in. use rapid start lamps.

- For economy and for shorter lamps use the general line.

This is the way G. E. puts it: "The 8-ft high-output (rapid start) fluorescent gives you 40% more light than any other fluorescent lamp type. Most light per fixture—costs least to maintain. Gives fine performance at very low temperature. . . . The 8-ft slimline is preferred in many installations where ceilings are low and where you want lower fixture brightness and less reflected glare. Their 8-ft length and high efficiency make slimlines lower in first cost and in maintenance than any other 4-ft lamp system."

Fluorescent tubes and fixtures are widely used today to light low-bay industrial areas; sometimes also in high-bay regions. However, since the light output per foot of tube is limited, fluorescent light sources often cannot provide the necessary lumens for high-bay plants. Such developments as the power-groove lamp—promising double light ouptput—will increase the use of fluorescents in high bays.

A common trend in fluorescent industrial lighting today is to employ two or four fluorescent lamps set in vented, aperture reflectors that throw 10 to 25% of the light up. A typical installation is one made for Arvin Industries, Inc., Columbus, Ind., manufacturers of mufflers for the automotive industry. The lighting layout was by the Public Service Co. of Columbus, for a mounting height of 12 ft.

Illumination of 60 ft-c at working height was achieved with 150 10% aperture reflectors (10% uplight), suspended by chains from overhead, and containing two 8-ft, 800 ma rapid-start lamps per unit. Fixtures are staggered—8 x 20 ft on centers.

When walls and ceilings are painted with light-colored or reflective paint, fluorescent lighting can offer high quality and provide a comfortable working atmosphere. This was done by the Wakefield Brass Co., Vermilion, Ohio, for a fabrication and assembly area. Light wall and ceiling surfaces, plus a white concrete floor, working with continuous rows of 2-lamp fluorescent units, provide an illumination level of 60 ft-c. The fixtures were mounted 15 ft from the floor and designed to throw almost 50% of the light up. The continuous rows were set on 9-ft centers.

Rapidly gaining in popularity is the trans-lighted ceiling. This consists of fluorescent units mounted in a plenum or double-ceiling area. The upper ceiling is generally painted with white or reflective paint, while the ceiling below the lamps consists of translucent plastic or some other diffusing material. The impression to the viewer is one of wall-to-wall lighting.

One common form of trans-lighted ceiling is the parallel-grid type. Here, parallel tees suspended from the ceiling overhead by wires or bars, support plastic diffusers. The plastic is generally corrugated for strength. Among the advantages claimed for this type of lighting are:

- The diffusing ceiling conceals piping and vent lines, hence is more attractive.
- The plenum area between the hung and real ceilings can be used to temper and diffuse air being supplied to the building.
- The system is claimed to be fire-resistant. Corrugated plastic is designed to buckle if room temperature rises above a certain level. It then falls off supporting tees, exposing a sprinkler system.

An added advantage of this type of ceiling and lighting is that it can be coordinated to control sound as well. A grid of acoustical absorbers can be suspended from the tees. These absorbers are often in the form of perforated 6 to 12-in. deep metal wedges inside of which is glass-fiber material.

Such a system was installed recently for Davis & Geck, Inc., Danbury, Conn., manufacturers of surgical sutures and needles. Eighty foot-candles of general lighting were provided by a trans-lighted plastic ceiling set about 12 ft off the floor, backed by 40-watt rapid-start fluorescents. In this case, sound baffles were incorporated as well.

• What does the future hold?—In the immediate future is high-frequency or high-cycle lighting. Already tried in several installations, it promises big savings because as frequency goes up:

- Efficiency of lamps increases. (A 20-watt 1½-in. fluorescent has an efficiency of 48 lpw at 60 cps, of 53 lpw at 600 cps, of almost 57 lpw at 6,000 cps.)
- Lamps can be loaded to greater wattage without shortening their useful life.
- Stroboscopic effect diminishes.
- Smaller and lighter fluorescent components (ballasts, reactors, capacitors) are needed.

In the offing may be even bigger developments. The trans-lighted ceiling is, perhaps, only the begining for area lighting. With electroluminescence may come an entirely new age in lighting. Not only will ceilings glow, but in future industrial buildings, walls and possibly equipment, too, will give off light.

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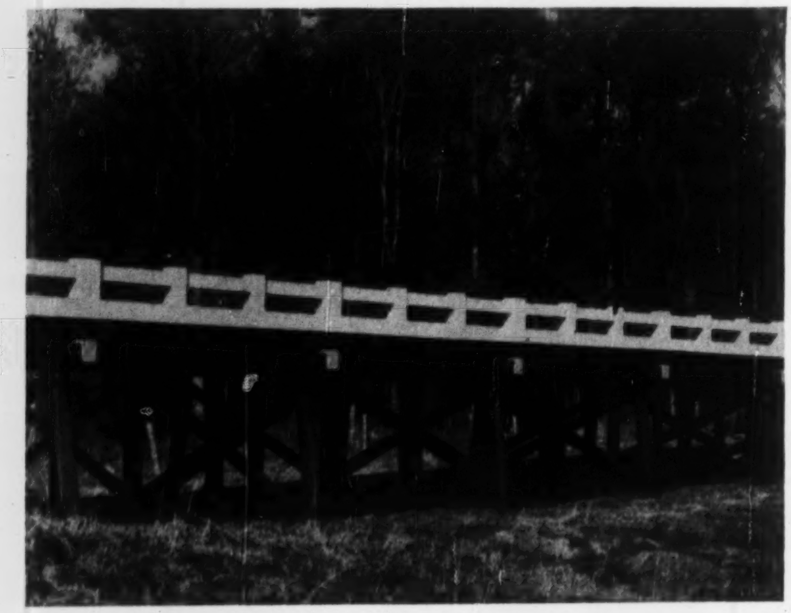


Low cost . . . to build and maintain. This Alabama bridge of pressure-creosoted wood has given excellent service since 1951 and has required a minimum of maintenance. There are thousands of similar bridges throughout U.S.A., carrying heavy loads day after day.

- ☐ **Water resistant**
- ☐ **Lightweight but strong**
- ☐ **Low in initial cost**
- ☐ **Easily worked with simple tools**
- ☐ **Never a rust, rot or spalling problem**
- ☐ **Never needs painting**

WOOD is one of the most versatile of construction materials. When it is pressure-creosoted to eliminate rot, insect and borer damage, it becomes a permanent construction material suitable for some of the toughest construction jobs.

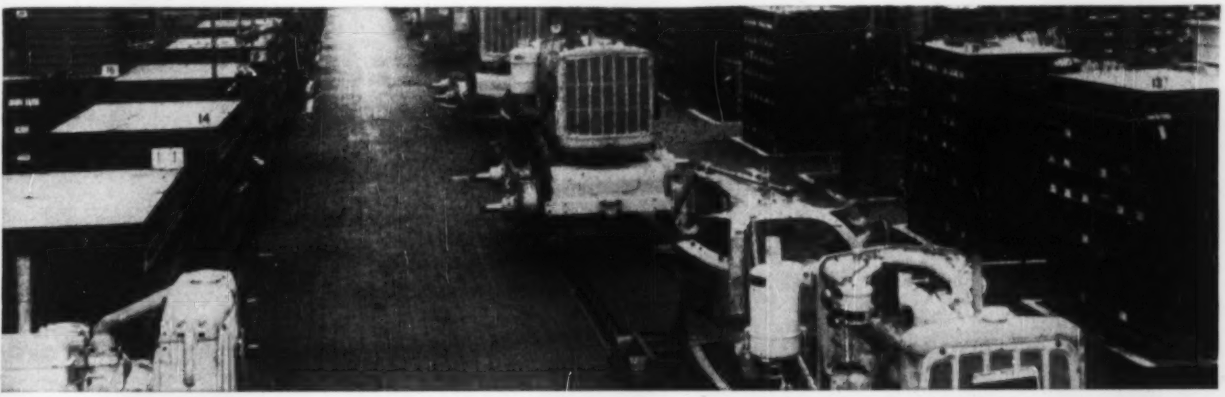
If you have overlooked wood—or underestimated it—as one of your primary materials of construction, consider some of the uses pictured on this and the next page.

WYANDOTTE
COUNTY PARK
ENTRANCE

Wood sign posts never need maintenance painting when pressure-creosoted. Park signs like this one in Wyandotte County Park, Kansas, utilized sections of pressure-creosoted piles or poles. Such signs are not only attractive and easy to install, but also cost less than signs made with other commonly used materials.

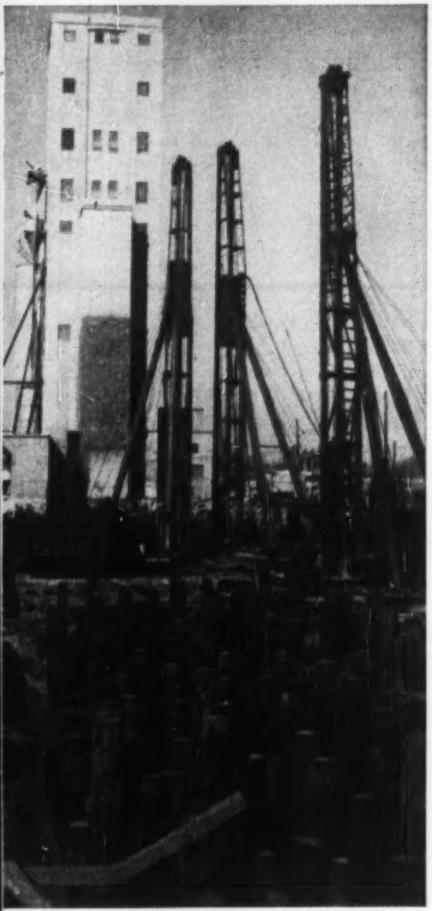
Easily assembled. Neither expensive forms nor expensive skilled labor is required to make pressure-creosoted cribs like these, installed on the McKensie Pass Highway near Eugene, Oregon. Pressure-creosoted cribbing doesn't spall, can be used again if the road is relocated and costs less than other types of cribbing.

As strong as steel. Pound for pound, pressure-creosoted wood guard rail posts have greater impact resistance than steel posts! They cost less than other posts commonly used and never need painting. These pressure-treated posts were installed on a highway in Oregon State to support galvanized cables and fittings.



Toughest floor available. Spark-proof, skid-proof, safe and economical floors are provided by pressure-treated wood blocks, cut and laid on grain ends. Over 778,000 sq. ft. of such flooring has been installed in this building—over 3.3 *million* sq. ft. in other plants at Caterpillar Tractor Co., Peoria, Ill., since 1920.

A dollar or less per square foot. Permanent cover at low cost is provided with economical pressure-creosoted pole construction. This Baltimore auction house, for example, withstood Hurricane Hazel's 100 mph winds which ravaged and destroyed other buildings in the vicinity! Treated poles in the ground will last 30 years or more, to give you *permanent* protection against rot and insects.



Good for 50 years or more. A total of 4,744 pressure-creosoted timber piles was used to support a 3-million-bushel addition to this grain elevator in Kansas City. At less cost in place than other commonly used piles, pressure-creosoted piles provide excellent protection both above and below ground—with never a rust, rot or spalling problem.

WHY CREOSOTE IS THE BEST WOOD PRESERVATIVE AVAILABLE

Ideally, a wood preservative should: be toxic • stay in the wood • be impervious to water • penetrate deeply into the wood • be highly adhesive • resist action of chemicals in soil and water • provide a clean, dry finished product.

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There are over 160 known chemical compounds in Creosote, all of which are toxic to organisms that are destructive to wood.

Creosote, because of the nature of its chemical components, has high penetrating characteristics.

Because Creosote is impervious to water and highly adhesive, it will not leach or hemorrhage out of the wood.

These characteristics, plus the stability of the compounds in Creosote, also mean that its effectiveness is not neutralized by contact with acids or alkalis characteristic of certain soils.

Creosote, when applied under carefully controlled pressure treatment, gives you a finished product that is clean, dry and easy to handle. It becomes a permanent construction material that never needs to be painted or coated; will not rust, rot or spall.

There are over 300 modern wood treatment plants through the United States that stand ready to serve you.

For information on availability of pressure-creosoted wood in your area, write Koppers Company, Inc., Tar Products Division, Pittsburgh 19, Pa.

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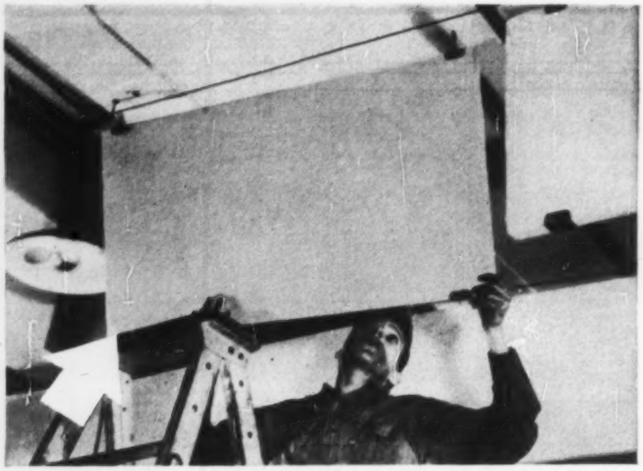
CREOSOTE

Better Perforated metal panels backed by mineral wool pads offer high sound absorption. Here, workman mounts 12x12-in. panel in its supporting T-bar frame.



Faster Acoustical baffles are a swift solution to quieting industrial din. The 2x4-ft glass-fiber panels are rapidly hooked on wires stretched over the noisy area. Wires are spaced from 3 to 6 ft apart. Hooks on beams keep wires from sagging.

New Levels in Noise Control

Acoustical consultants are mobilizing new methods and devices in the battle against industrial noise

Industry, as never before, is striving to muffle its noise. And in the search for quiet a host of new concepts and products are being developed. Devices range from baffles and odd-shaped boxes suspended over noisy machinery, to prefabricated absorptive booths that enclose the workers or noise source. Even noise itself is being employed to counteract noise.

Reasons behind the newly aroused interest in noise control are many. There is the problem of lessened production due to noise. The incessant din of machinery can cause nervous tension or exhaustion from having to shout and hear instructions. These effects, in turn, lead to absenteeism.

There are also mounting claims for hearing loss. In New Jersey claims for occupational loss of hearing filed against a single company amount to more than $5 million. Benefits in Wisconsin for total loss of hearing are $12,333 per individual; in Oregon, $8,600; in New Jersey, $6,000.

Plant personnel are not the only ones concerned with industrial noise. Plant neighbors, too, are on the sound warpath; there is a growing trend to zone against noisy industries. In 1947, Armour Research Foundation's acoustics staff was requested by certain cities to classify industries as to probable noise output. An outcome of this is Chicago's proposed new zoning standard which specifies noise levels for zoning.

• What can you do about it?—Noise control should be handled in the planning stage, not later. Statistics show that if handled later it will cost three times more on the average. Unfortunately, planning for sound has not generally been the case, and most acoustic materials in buildings today were applied to correct faults discovered after the building was in use.

• Who plans noise control?—In one way or another, each member of the construction team (owner, architect or engineer, and builder) is responsible for noise control. But primary responsibility rests with the designers and plant engineers. It is they who must be familiar with site noise problems, sources of noise in mechanical equipment, and sources that the owner will add later. They are the ones who must evaluate the building's use to determine acoustic-insulation requirements for walls and floors.

No less important is the proper installation of acoustic materials, and this is the responsibility of the contractor. Lastly, it is the owner who must answer to his workers and neighbors for the existing noise level.

If the noise problem is complex or critical, costly mistakes can often be avoided by calling in acoustical consultants. Their job is to suggest solutions to a plant's noise-control problems and coordinate efforts to eliminate them. The growing number of firms in this field testifies to the increasing importance of the specialty.

• How to plan noise out of plants—Planning for noise begins with site selection. Here, the question is how to reduce the potential disturbance to neighbors.

Cheaper Multipurpose board offers economy because it is acoustical treatment, thermal insulation and form for the roof slab all in one. Cost of the roof, exclusive of buildup roofing, is from $0.45 to $0.60 psf. Here, men screed gypsum roof deck.

Acoustic experts report that neighbors will tolerate a noise better if they have been exposed to it before. Thus, while many owners wish to locate their plants in areas away from industries, it may be wiser from an acoustics standpoint to select a site not only industrialized, but industrialized with similar industry.

Also to be considered in site selection are foliage and terrain. Both can contribute to reduce the level of noise reaching neighbors. It is a good idea to locate a plant in a valley, separated by hills from nearby communities.

Since sound intensity falls off inversely as the square of the distance, another way to lower noise levels for neighbors is to surround the plant with plenty of land. This has been found feasible for noise reductions up to 10 db. Above this amount, additional land costs become prohibitive.

• Some tips on plant layout—In laying out a plant for sound, the planner should strive to separate noise sources from noise receivers. If possible, arrange the factory so that quieter sections, such as offices and drafting rooms, will be distant from noisier functions, such as stamping and production areas. An ideal acoustic layout would have plant operations arranged in ascending or descending order of sound level.

In addition, the designer should try to interrupt or alter noise paths between sections. One method is to provide corridors between plant operations. Corridor space, in effect, provides multiple wall construction between source and receiver.

With the site selected, the plant laid out, several features can be incorporated in the exterior to further reduce noise. Sound emanating from the plant can frequently be substantially reduced by adopting nonoperable windows and air conditioning. Since air conditioning sometimes gives rise to interior noise problems, the planner should be careful that in solving his outside problem, he is not giving rise to a new one inside.

Sometimes, in spite of precautions beforehand, an outside noise problem is not discovered until after the plant is built. Such was the condition encountered by the Charles J. Pfizer Co. at its Groton, Conn. plant. Neighbors complained about noise from the factory's air-intake compressor. The solution was a specially designed air-intake silencer built by Industrial Acoustics Co., Inc., New York, N. Y. The silencer was so successful that it was impossible to tell just by listening whether or not the compressor was in operation.

• How to combat inside noise—Reduction, isolation and protection are the key to acoustics within the plant. Reducing the noise at the source is best, but if this is not feasible, then isolate the area from which the noise arises. Usually, however, some people must work in the isolated area; they require protection from the noise.

First step in planning an interior area for noise control is to review each industrial process. Frequently it is possible to substitute other processes that use less noisy equipment. One might investigate, for example, welding or bolting in preference to riveting.

Next look into the noise characteristics of the various types of machines.

Today, more and more manufacturers are making noise source data available for the machines they produce. One source of such data is: H. B. Karplus and G. L. Bonvallet, "A Noise Survey of Manufacturing Industries," American Industrial Hygiene Association Quarterly 14, 235 (1953).

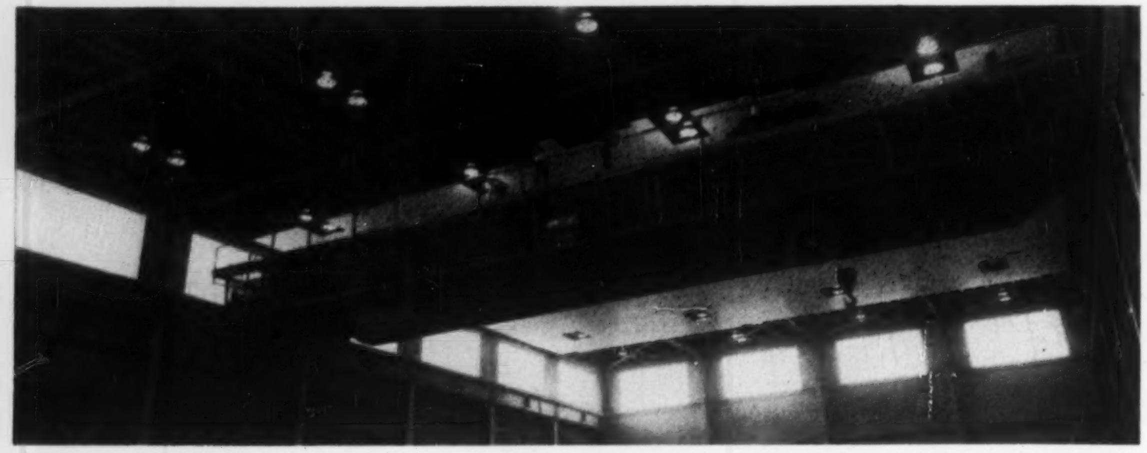
While owners generally like to keep machines spaced as close as possible for good production, such spacing has a direct bearing on the noise level. To keep sound at a given level as machine spacing is decreased, ceiling height must be increased, as must be the sound absorption of the ceiling.

• Sound takes three paths—Within a plant, sound arising from various sources, such as machinery, travels to the workers' ears in one of three ways—either as direct sound waves, reflected waves, or waves telegraphed through the structure itself.

• Warding off direct sound waves—The recipient of direct sound waves is most commonly the machine operator. A simple way to solve a potential hearing damage problem in this case is to provide him with ear protectors. However, many workers are reluctant to wear such protectors. Many become used to the din and don't believe that it will hurt their hearing. Some, such as drop-forge workers, claim their skill is derived from their ability to interpret the sounds of the machines.

In lieu of ear plugs, another solution is to silence the machine or source itself. Allis Chalmers Mfg. Co. did this at its La Crosse, Wis., plant. Among the solutions to noise problems were these:

- Mufflers on the exhaust end of air vises, which cut noise at the source from 94 to 79 db.
- Substituting wood benches for metal benches, which required noise in the foundry cleaning room 7 db.
- Enclosing grinding operations in 2x2x2-ft cubicles lined with acoustic board, which dropped the over-all sound level as much as 12 db.
- Lining the hoppers for castings with three layers—¾-in. soft wood, ¾-in. oak, and 10-ga perforated sheet steel—cut noise 16 db. The lining was held by bolts that were padded with rubber-and-fabric washers and bush-



SPEEDY INSTALLATION of mineral-wool-backed perforated metal panels for Dayton Power and Light Co., Dayton, Ohio, was done from atop the high bay's overhead crane girder.

ings. On the outside, the hoppers were sprayed with ⅛-in. mastic.

• **Put a box around it**—A popular solution is to enclose the offending piece of machinery. Plant personnel can fabricate their own enclosures, or several firms will design and build them to order. One leading firm in this field prefabricates its enclosures with special acoustic sandwich panels. These consist of 16-ga sheet metal on the outside, a glass-fiber core, and a 20-ga perforated sheet metal backing. Usual panel thickness is 4 in., although panels of 2.3, 6, 8-in. are available.

Faced with employee hearing loss due to the high-frequency output of its cutting machines, Hercules Powder Co., Hopeville, Va., purchased seven such soundproofed enclosures. Each was used to house two cutting machines. A noise reduction of 40 db resulted, and measurements showed that noise levels in all frequency bands were so low as to preclude any danger of hearing loss.

Sometimes, a double-walled enclosure is necessary to reduce sound sufficiently. Even though Goodyear Aircraft Co., Akron, Ohio, was careful to provide good structural isolation for an endurance testing machine, its low-frequency noise output affected personnel, shook and vibrated surrounding structures. To suppress the heavy pulsations, the company had a double-walled soundproof panel enclosure installed around the machine. A 16-in. air space separates the inner and outer walls. Noise reduction achieved is 40 db.

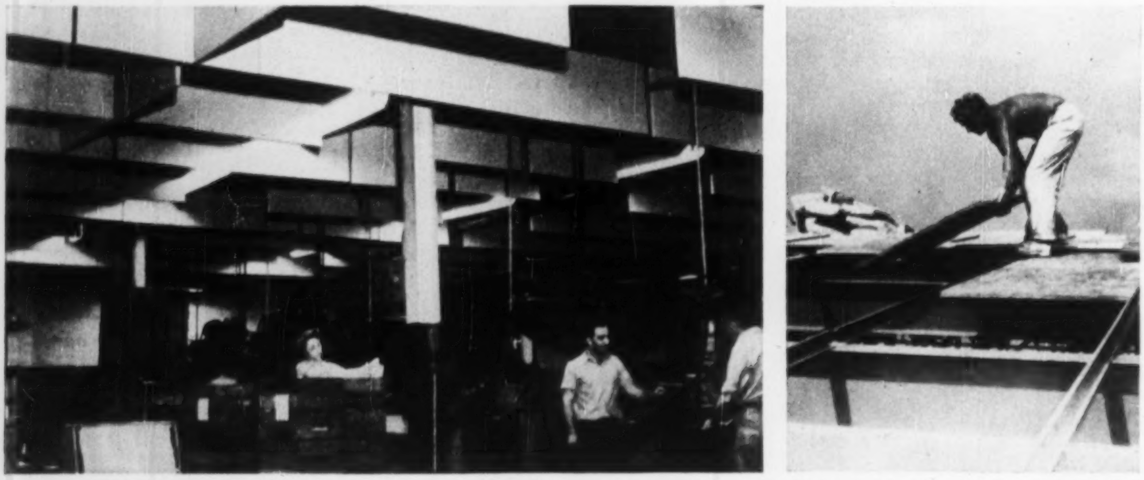
• **Reflected noise? Soak it up**—Reflection and re-reflection of sound from room boundaries is a major source of annoyance to workers in a room. New sounds then reinforce sounds subsequently created and there is a build up in noise intensities.

To combat reflected noise, sound-absorptive materials, such as glass and mineral-wool blankets, are used. Being porous, these materials reflect little of the noise, instead absorb it, transforming the sound energy into heat by viscous and frictional forces.

Absorptive materials come in many shapes, and types. There are tiles and panels for walls and ceilings, sprayed-on plasters, hung baffles, as well as suspended absorbers of a wide variety of shapes including conical and rectangular. Each of these products is designed to solve certain types of noise problems; none is a cure-all.

Most widely used of the absorptive materials are the many varieties of wall and ceiling panels. Some of the common types are:

- Perforated wood-fiber squares, 12 x 12 in., available in ½, ¾ and 1-in. thicknesses. These tiles are low cost, can be cemented to plaster, concrete or plasterboard ceilings, or fastened to furring or plaster board with nails or screws. They can also be installed with a metal suspension system.
- Perforated metal pans backed with mineral wool. One drawback of this type has been the tendency of



EGG-CRATE SYSTEM of acoustic baffles quieted industrial din for Western Printing & Lithographing Co., Racine, Wis. Baffles were spaced in rows 4 ft apart.

DOUBLE-WALLED ENCLOSURE was resorted to by Goodyear Aircraft Co. to silence a noisy endurance-testing machine. Noise was reduced to 40 db.

PERFORATED METAL is placed over glass-fiber on wall for sound deadening.

the mineral wool pad to soak up paint when panels are repainted. Some manufacturers are getting around this by arching the acoustic pad (ENR May 17, p. 67).

- Square perforated asbestos-cement panels backed with rock wool blankets or paper-wrapped wool pads. A popular size is 24 x 24 in. Thickness of one brand is 1$\frac{3}{16}$ in. or 2$\frac{3}{16}$ in.
- Perforated, corrugated metal sheets (one size is 24 x 96 in.) placed in front of glass-fiber mats. Tees support the glass-fiber panels and offer a base for fastening the perforated metal sheets.

A typical example of speedy installation of acoustic panels is the O. H. Hutchings Electric Generating Plant, Dayton Power and Light Co., Dayton, Ohio. Here, mineral-wool-backed perforated metal panels were placed on 17,000 sq ft of high-bay ceiling. Rapid installation was made possible by having the men install panels from an overhead crane girder, instead of scaffolding. As work progressed, the crane girder was moved along its tracks. Since it spanned the bay, no other scaffolding was needed.

An extremely low-cost way to obtain acoustic treatment is with a lightweight concrete deck with good acoustic properties on glass-fiber form board supporting a cast-in-place gypsum roof deck.

Cost for form board roof construction runs from $0.45 to $0.60 per sq ft. The saving derives from use of the form board for three jobs—(1) form for the roof slab; (2) thermal insulation and (3) acoustic treatment. Form board comes in 1-in. thicknesses, in 32 or 24-in. widths by 48 in. long, or purlin length.

Such a roof system was installed for Magill-Weinsheimer Co., Lincolnwood, Ill., a printing firm. Glass-fiber form boards supported on bulb tees and open-web joists not only reduced noise from such equipment as a huge, four-color 76-in. offset press, but also cut fuel bills by up to $3,600 per year.

CONICAL ABSORBERS suspended from ceiling and strung together keep down decibles at carpenter shop of RCA's research lab, Princeton, N. J.

Becoming increasingly popular for absorbing industrial din are what are termed "functional sound absorbers". These devices, in a variety of shapes and sizes, are most often used to correct a noise problem after the plant is in operation. They are usually hung at some predetermined spacing throughout the noisy area.

One such absorber, called Sonosorber, saved the day for Dow Chemical Co. when used to still the noise in the plastic strand cutting room of Dow's Gales Ferry, Conn., plant. Over-all decibel readings dropped from 107 to 96 after suspending 150 absorber units from steel wires strung wall to wall. The Sonosorber is a hollow, diamond-shaped box, 12 x 12 x 24 in. The outside of the box is a perforated aluminum skin; inside is a glass-fiber insert. Fastened by small wire clips, the units weigh only 2½ lb apiece and were easily installed by Dow's own personnel.

Another type of hung absorber is a small pyramid formed with perforated aluminum sheets and containing a glass-fiber core. Still another is in the shape of two cones placed base to base. Suspended from hangers dropped from the ceiling, conical absorbers of this type quiet the carpenter shop of RCA's lab at Princeton, N. J.

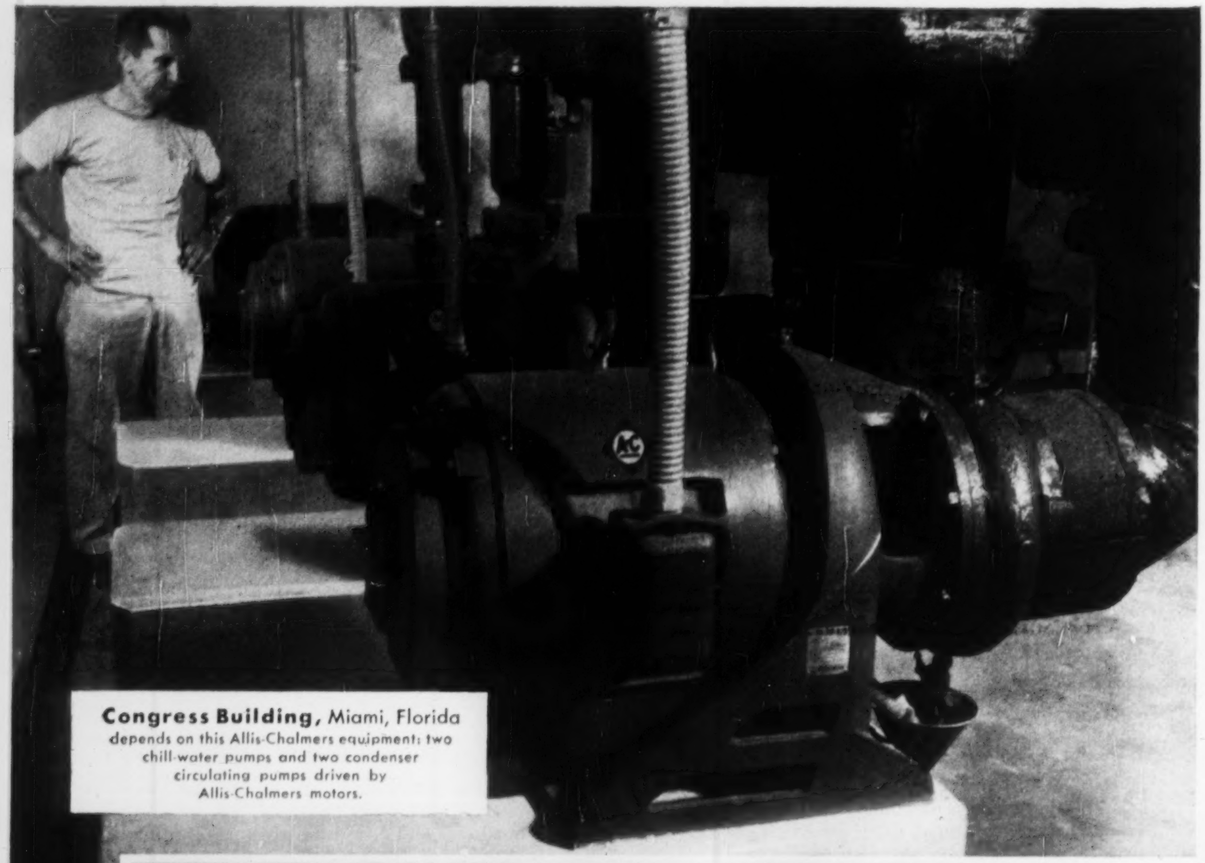
A widely used sound absorber is the 2x4-ft acoustic baffle. Baffles are 1-in. thick, consist of panels of glass-fiber board that have been coated with a plastic film. Easy to install, they are merely hooked onto wires strung over a noisy industrial area. Depending on the noise reduction desired, the baffles can be strung parallel in either one or two directions. An advantage of the system is its low cost of from $0.25 to $0.40 per sq ft of ceiling treated.

By stringing baffles in one direction, the John Volkert Metal Stamp-

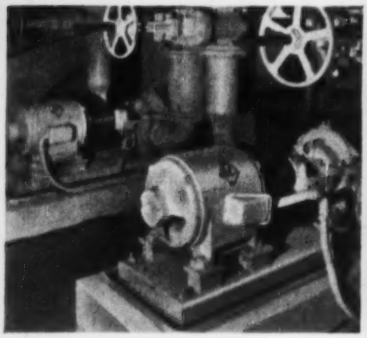
(Continued on page 80)

Wherever Quality Air Conditioning is a MUST . . .

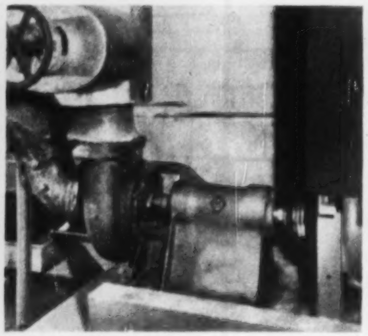
Contractors Count



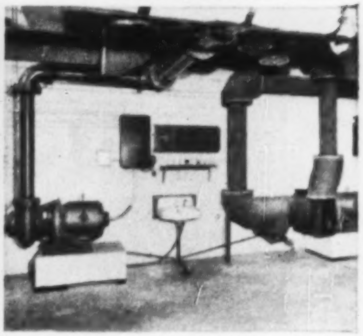
Congress Building, Miami, Florida
depends on this Allis-Chalmers equipment: two chill-water pumps and two condenser circulating pumps driven by Allis-Chalmers motors.



Broward National Bank
Fort Lauderdale, Florida



Fontainebleau Hotel
Miami Beach, Florida



Sunrise Shopping Center, Inc.
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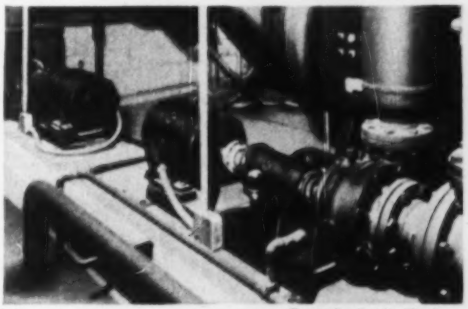
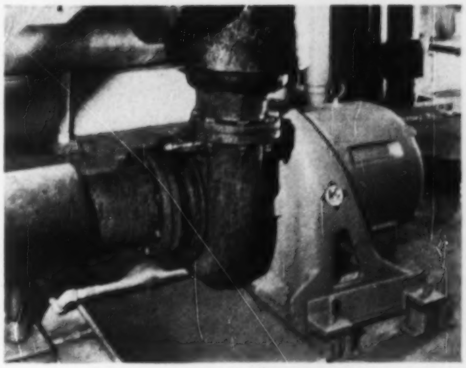


Temple Beth Sholom
Miami Beach, Florida



Jackson Memorial Hospital
Miami, Florida

Every one of these installations relies on Allis-Chalmers pumps and other products for season-round dependability

The air-conditioning contractors and consulting engineers who installed the systems shown here had two things in common:

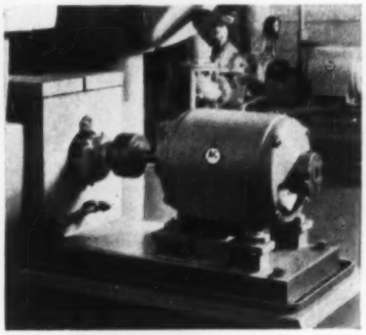
1. *They all wanted satisfied users.*
2. *They all specified Allis-Chalmers pumps.*

Allis-Chalmers pumps are known for their ability to keep systems circulating season after season. This means users can depend on having their indoor climate the way they like it — without fear of pump failure when cooling is needed most.

Here are other reasons why contractors and consulting engineers specify Allis-Chalmers:

- **BEHIND ALLIS-CHALMERS PUMPS** stand years of A-C pioneering in pump design and manufacture for every industrial and commercial use. This wealth of experience results in the best!
- **ALONG WITH PUMPS,** A-C supplies motors, control, and V-belt drives. Here's one source for products engineered to work together.

YOUR AIR-CONDITIONING CONTRACTOR is your best source for recommendations to meet your particular needs. He specializes in local requirements and conditions.

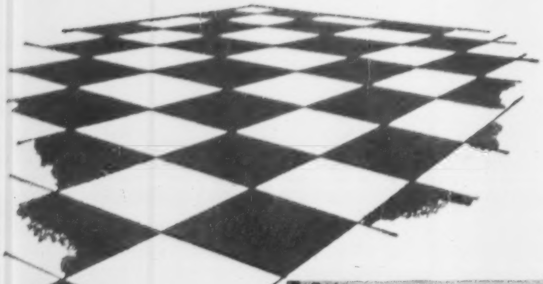


Southern Bell Telephone and Telegraph Co.
Miami, Florida

For All the details . . .

on air-conditioning pumps and related equipment call your nearby A-C office — they'll be happy to work with your consulting engineers and your contractor to solve your particular air-conditioning problems. Or write Allis-Chalmers, General Products Division, Milwaukee 1, Wisconsin.

CHALMERS



TAKES A LOT OF SQUARE FEET

to store cargo for Kroger's shopping cart fleet!

Floor space — enough to hold over 24 football fields — that's how much storage area is covered by International Steel to keep Kroger shopping carts filled! Six huge Kroger warehouses furnished by International now serve this famous and fast-growing grocery chain. Strategically located in Fort Wayne, Indiana; Louisville, Kentucky, and Little Rock, Arkansas . . . in the Ohio cities of Toledo, Columbus, and Cincinnati . . . they combine over a *million square feet* of modern storage facility. And *all* structural steel and long-span joists for these six Kroger warehouses have been supplied by International Steel Company. Any time you are shopping for fabricated steel, any amount and for any purpose, put International Service first on your list. It pays many ways!

See Complete Catalogs in Sweet's Industrial Construction Files Nos. 2c and 7a

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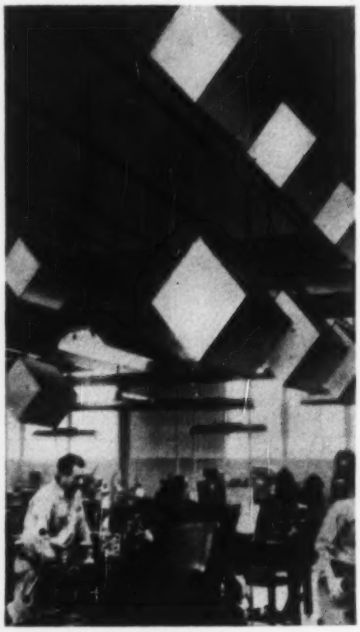

BOXLIKE ABSORBERS, suspended on wires, quiet Dow Chemical Co. plant, Gales Ferry, Conn.

ings, Inc., plant, Queens Village, N. Y. achieved a 50% reduction in noise. But North American Aviation Co., Columbus, Ohio, resorted to a two-directional or egg-crate baffle system (using 500 baffles) to reduce a 90-100 db noise level in its hammer and heavy press rooms. Now, tests show that zig-zagging the baffles will give the greatest noise reduction.

• **New tiles can be removed**—Tiles with core-filler insulation that can easily be removed for access to attic space were recently used to soundproof the developmental shop area of a Northrop Aircraft engineering building (now under construction at Hawthorne, Calif.) Savings of $0.20 per sq ft were claimed over a conventional suspended plaster ceiling with ordinary acoustic tile. The acoustic tile ¼-in. thick, 2x2 ft) was suspended by an aluminum tee system from roof slabs above.

• **Building-transmitted sound**—Noise from machinery can also be carried through the plant by the structure itself. Floors, air-conditioning ducts, piping, and steel or concrete framing all make excellent conductors of noise. The key to stopping structure-sent noise is to isolate it by providing breaks in the structure, putting up sound barriers, or inserting resilient materials in existing joints.

In planning, consideration should be given to the frame of the plant. Sounds are transmitted rapidly by a continuous rigid frame of concrete or

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Note how the light-and-shadow textures of Asbestone's corrugations blend with the vertical metal battens to make an architecturally pleasing facade. This hanger's roof is Gold Bond Asbestone, too. Walls and roof are fireproof, rot-proof and they never need maintenance.

How many uses can *you* think of for Gold Bond CORRUGATED ASBESTONE? Whether it's in remodeling or new construction, commercial or industrial, ASBESTONE creates striking good looks and permanence—means added protection and lower maintenance. Write for full details on this versatile, good looking material.

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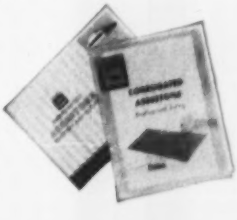
Orleans 15, La.



Gold Bond Technical Bulletin No. 2032 and Booklet No. 2273 give full specifications and uses of Gold Bond CORRUGATED ASBESTONE Products.

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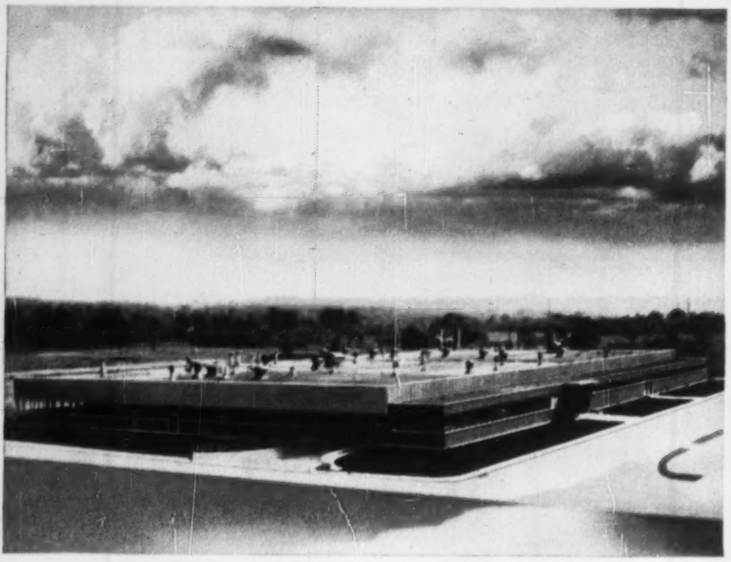
Lok'd Bar FACTORY SASH



New Super-Precision Plant for the Marlin-Rockwell Corp., Falconer, N. Y.
Wigton-Abbott Corporation, Engineers-Contractors

274 HOPE'S STEEL LOK'D BAR SASH

were used in the construction of this modern plant.

The greater strength and rigidity of Hope's Steel Windows assure ease of operation and weathertightness that will last the life of the building. In addition, their greater strength permits long, uninterrupted rows of windows; some of the openings in the building shown are more than 200 ft. long.

For full information on Hope's Steel Lok'd Bar Sash ask for Catalog 103E.R.

HOPE'S WINDOWS, INC., *Jamestown, N. Y.*

The Finest Buildings throughout the World are Fitted with Hope's Windows

steel, but not nearly so well by nonhomogeneous construction. Even better blocking of noise paths is provided by structural breaks sealed with a soft mastic.

One way to stop transmitted noise at the source is to place machinery on scientifically designed vibration mounts. These are rubber or spring mounts engineered to transmit as little of the machine vibration as possible to the floor. Each mount should be designed for the machine it supports, since the wrong mount can actually make the condition worse than none at all. The offending piece of machinery can be additionally isolated from the rest of the structure by setting off the portion of concrete floor on which it is set by a joint filled with mastic.

An effective way to isolate a room or machine from the rest of the plant is to erect a sound barrier. An ideal sound barrier combines mass, imperviousness to air flow and multiple wall construction. Good barriers are impervious materials such as glass, plaster or wood, that absorb little incident sound energy. Multiple walls are generally superior to homogeneous walls of the same weight. For instance, two 4-in. brick walls spaced 4 in. apart will give a greater sound-transmission loss than a solid 12-in. brick wall. But it is important, if double-walled construction is planned, to have each element of one wall structurally independent of the other. Structural ties across the air space cancel the benefit of the double wall. A final fact to remember in planning a good barrier is that even the smallest crack will permit a flood of noise to get by. To stop noise, seal off all possible leaks around doors, windows and ventilation openings.

And the future?—While today acoustic experts are able to predict the noise level of a plant before it is built and then design it for quiet tomorrow sound-cancellation devices may simplify quieting even more. One will merely turn on a "magic" box that is equal to the unwanted sound in level, but opposite in phase, and the two sounds will cancel each other out.

Information for this article was supplied by the following acoustical consultants: Bolt, Beranek & Newman, Inc., Cambridge, Mass.; Armour Research Foundation, Illinois Institute of Technology, Chicago, Ill.; Industrial Sound Control Division, Koppers Co., Hartford, Conn.; Industrial Acoustics Co., Inc., New York, N. Y.; Mine Safety Appliances Co., Pittsburgh, Pa.; Elof Hansson, Inc., New York, N. Y.; Lewis S. Goodfriend, editor, NOISE CONTROL.

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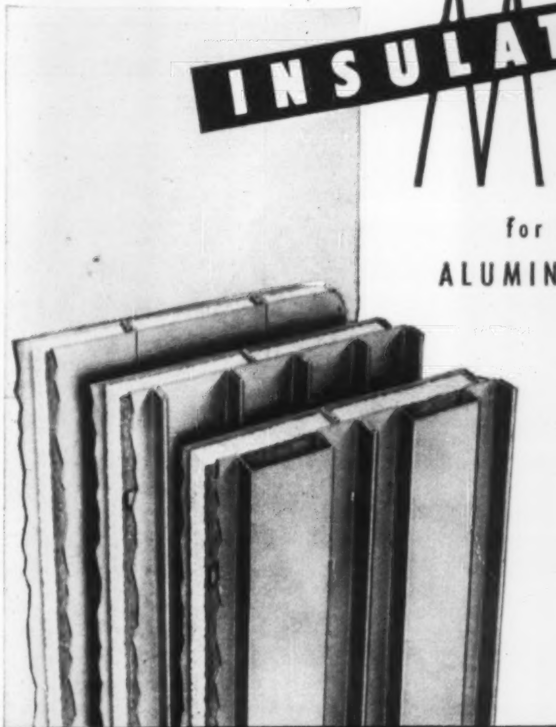

Insulated Metal Curtain Walls are more practical, more economical, and, in many respects, superior to masonry construction . . . they cost less, can be erected faster, and their thermal properties rate higher than those of a conventional 16″ masonry wall. Costwise, Insulated Metal Walls save up to one-half the cost of masonry construction in some types of buildings. Erection is fast . . . buildings can be quickly enclosed regardless of weather. From an appearance standpoint, bright metal—aluminum or stainless steel—in combination with brick or other materials produce distinctive exteriors . . . design effects in exterior treatment are virtually unlimited. In the Mahon "Fluted Wall", and the "Ribbed Wall", vertical joints are invisible—symmetry of pattern is continuous and uninterrupted across the wall surface . . . and both of these walls can be field-constructed up to sixty feet in height without a horizontal joint—two features of Mahon walls which are extremely important in powerhouses and other types of buildings where high expanses of unbroken wall surface are common. These two features were engineered into Mahon walls to give you a finer appearing job without unsightly joints—you'll want them in the wall you select for your next building. See Sweet's, or write for Catalog W-56.

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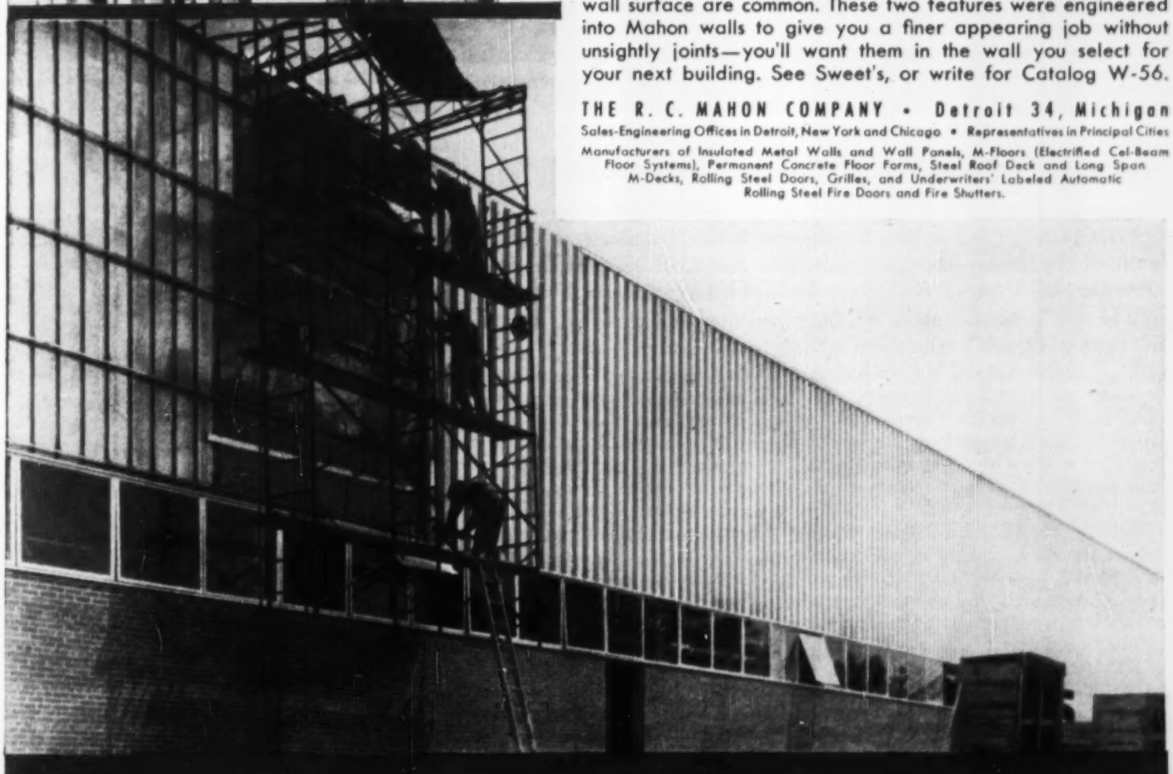

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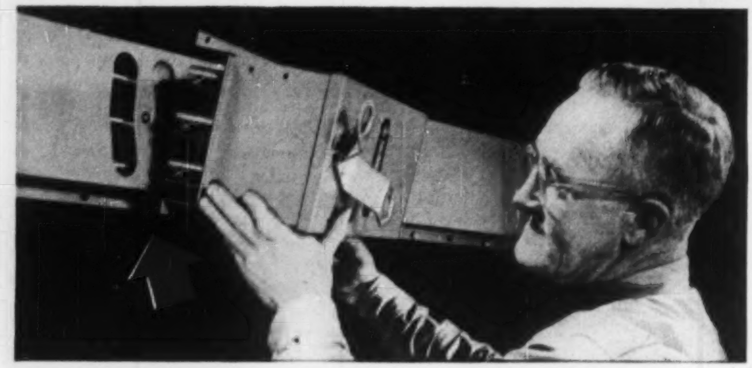
MAHON

Better

Timing of complex operations is more efficient with a central remote control system. By imposing coded signals on plant wiring, the unit can start or stop any item of equipment in the plant at any predetermined time.



Faster

Plug-in busduct, with openings every foot or two, makes it easy to add or shift machinery—and with no wiring changes.

Power Systems Advance With

Price pressure is sparking big changes in modern electrical distribution. Some of the ideas—like using aluminum instead of copper—are the result of technological advances. Others—like distributing power at 480 v instead of 120 and 208 v—are old hat, but when they first came up, the time was not right to do much with them in industrial buildings.

The present boom in industrial building has changed the picture. Today, methods and materials—old or new—that promise to lower the cost or raise the quality of electrical distribution are getting an opportunity to do it. Added impetus in the search for distribution improvements arises from higher standards of lighting and ventilating, the growing demand for air conditioning, and the replacement of manpower by electrical power on the production line.

Electrical systems are taking nearly twice as big a bite into the industrial building dollar as they did in 1940. The bite would be even bigger except for the fact that industry is turning to:

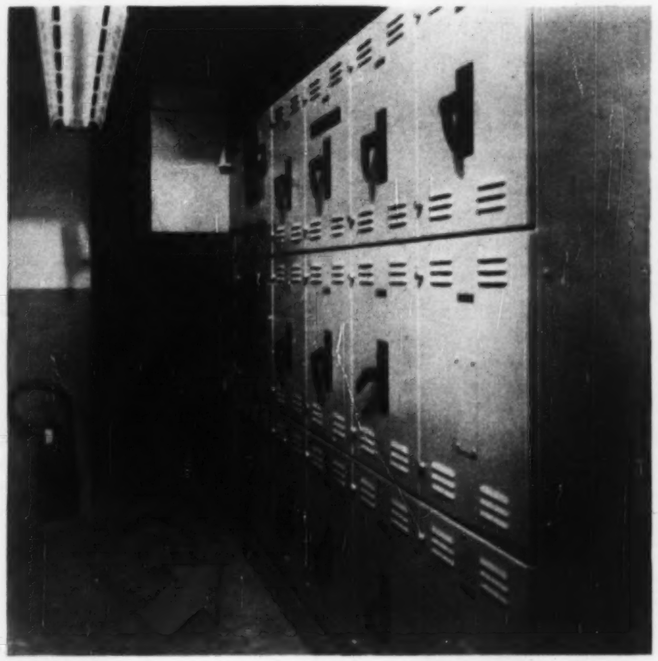
- **Higher voltages**—to trim conductor sizes and raise lighting efficiency.
- **More substations**—to shorten secondary feeders and make systems easier to expand.
- **More dependable layouts**—to keep the wheels turning when power equipment fails.
- **Improved conductors**—to add flexibility and cut labor costs.
- **Greater circuit protection**—to reduce equipment damage and downtime.
- **Better controls**—to fit complex operations.

Outstanding copper savers are high-voltage distribution and multiple substations. These helped Ebco Manufacturing Co., of Columbus, Ohio, win a citation for planning excellence from Factory Management and Maintenance magazine. Walter E. Metzger & Associates, also of Columbus, designed Ebco's electrical system with 480-v secondary feeders radiating from four unit substations, where stepdown transformers, switchgear and protective equipment are located. Each substation is centrally placed with respect to the motors, lights and other loads it serves. This keeps the secondary feeders short. Primary feeders bring 13.2 kv to substations from a switching station in one corner of the plant grounds.

Why not have all the transformers at the switching station and run the 480-v secondary feeders from there? One big reason is that it takes 28 times more copper to carry power at 480 v than at 13,200 v.

Lockwood Greene Engineers, Inc., of New York, did about the same thing in P. Lorillard Co.'s new plant in Greensboro, N. C. From the utility company entrance, they ran 12.5-kv feeders to nine unit substations. Seven of the substations, serving the production areas, step down the voltage to 480. The other two feed 120/208-v loads in the offices and laboratories and 2,400-v compressor motors for the air-conditioning system.

- **High-voltage lighting pays**—Distribution at high voltage has a number of advantages. Large motors and their controls usually cost less than those for lower voltages; 480-v feeders, for instance, take half the copper



Cheaper Factory-assembled load-center substations combine transformers, switchgear and protective equipment in one compact package, have relatively low initial cost and are easy to maintain. Standardized components are interchangeable, quickly replaced, thus cutting down number of spare parts needed.

the Boom

required for 240 v delivering the same power; voltage drops are smaller than in low-voltage high-current conductors; and fluorescent lighting operates at higher efficiency and without special lighting transformers.

For Lorillard's general plant lighting, Lockwood Greene used 277-v phase-to-neutral connections. Metzger Associates tapped 465-v for the Ebco lighting and saved the cost of a fourth (neutral) conductor. The 465-v ballasts cost nearly a dollar more each, but the 25% copper saving made up the premium twice over.

Besides 480-v Y-connected, 3-phase systems, designers are using a number of other high voltages. Included are 2.4-kv delta, to feed heavy motors, unit substations and lighting transformers; 4.16Y/2.4-kv, 4.8-kv delta and 7.2-kv delta, to feed unit substations; and 13.2Y/7.2-kv, widely used as a utility feed to plants. The trend in large plants is toward 13.2-kv.

• Low voltage may be best—Despite its advantages, high voltage is not the most economical for many plants. Small factories with limited loads still find 120/208-v, 4-wire service the cheapest, particularly where the utility company service is at that level.

Where power loads are heavy compared to lighting, 240-v 3-phase, 3-wire distribution is common. Lighting may be served by separate 120-v service to the building or occasionally by line-to-grounded-tap connections.

Even when the utility does not supply low-voltage power, 120/208-v distribution might be more economical if most of the load is at those voltages. A group of Westinghouse engineers studied installations in one-story and multistory commercial buildings to locate the point at which low-voltage transformer cost overtakes high-voltage distribution economy. They took into account all the system components—service entrances, switchgear, transformers, conductors, luminaires, motors, ducts and protective devices. The results for one-story buildings showed that 460-v systems, with stepdown transformers for the 120/208-v loads, are cheaper if no more than about half the total load is 120/208 v. With greater proportions of 120/208-v demand, it is cheaper to distribute at that level. To cancel 460-v economy for tall buildings takes slightly higher proportions of 120/208-v consumption than in one-story buildings.

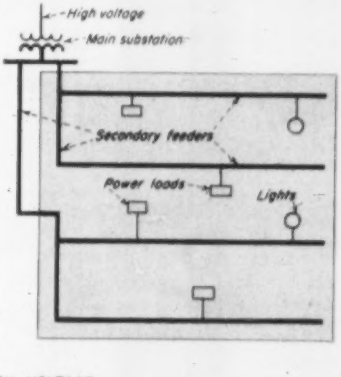
• Unit substations cost less—Apart from copper savings and considerations of what voltage level to use, load-center substations make it easy to expand an electrical system. A small initial investment allows a plant to add substations as the plant expands. This way, the electrical system grows to keep pace with the demand and does not require costly unused capacity to be installed at the outset in a main substation.

Many load-center substations are factory-assembled packages. A typical unit contains high-voltage switchgear in an incoming section, a transformer section where the voltage is stepped down to utilization levels, and a third section containing switchgear and protective devices for the secondary feeders.

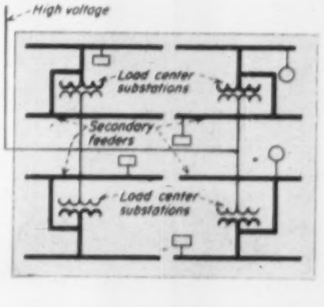
These prefabricated units simplify electrical system design and installation for the user. The manufacturer supplies installation instructions, can perhaps deliver the package faster and at less cost than the user can obtain components for a substation of his own design. Interchangeability of parts makes it easy to replace damaged equipment. If identical substations are used, a spare for one is a spare for all.

Dependability is another important advantage of load-center substations. One failure does not interrupt service to the whole plant. That was one of

LOW-VOLTAGE RADIAL-ONE SUBSTATION



HIGH-VOLTAGE RADIAL-SEVERAL SUBSTATIONS



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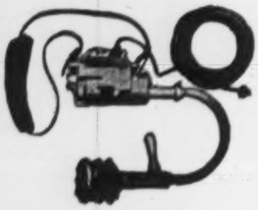

"Berg" equipment is used extensively for surfacing and finishing applications on concrete construction.

The many "BERG" Models available, permit exact selection for your particular application.

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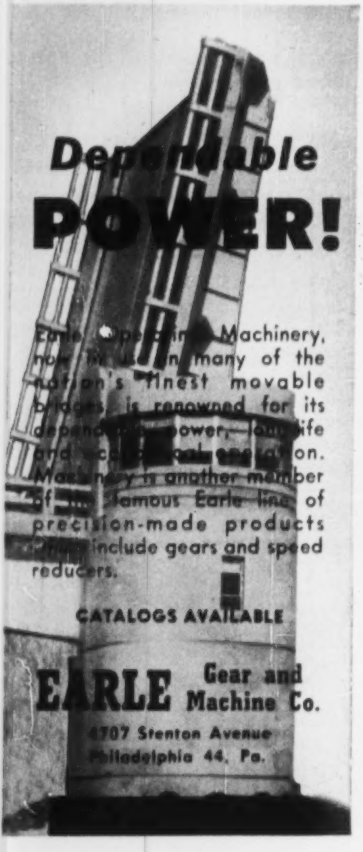

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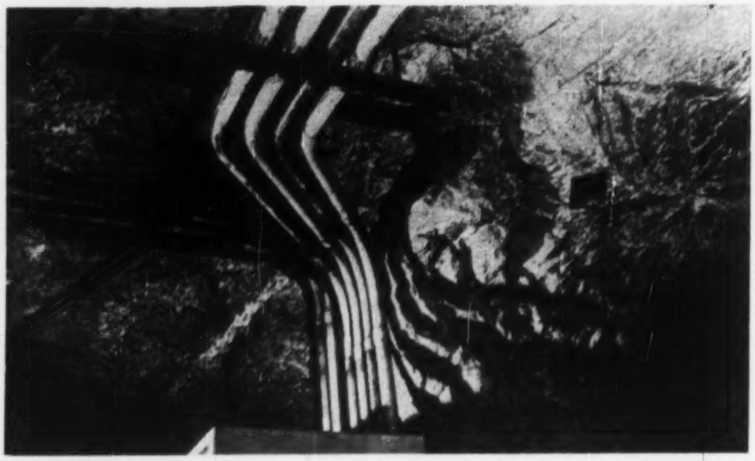

RIGID CONDUIT is still tops for mechanical protection of cables. In underground freezer warehouse above, some conduits are constantly covered with ice.

General Electric's aims when the company installed five substations to serve its General Purpose Control Department, in Bloomington, Ill.

Hedging further against stoppages—even local ones—GE linked four of the substations, in two pairs, with secondary ties. If a transformer drops out, its partner shoulders the load, at least the essential part of it. The fifth substation is on its own, but it has three transformers, any two of which can carry most of the load.

More complete insurance against power failures is desirable where outages would be costly enough to justify the added expense. The degree of reliability can range up to almost foolproof, and the cost may go up to 75% or more above the cost of the least expensive systems. Most firms compromise by balancing needs against costs.

• More feeders, less downtime—Walter Kidde Constructors, Inc., of New York, is emphasizing primary service reliability in the Johnson and Johnson plant now under construction at North Brunswick, N. J. Four feeders will supply five unit substations, each of which can tie into any feeder.

In the Ebco layout, Metzger Associates provided two primary lines, each feeding two of the four substations in the plant. Spare cable terminals, installed on one substation served by each feeder, will speed up the emergency installation of a cable tie if one primary line fails.

On the low-voltage side, all four substations are tied to a single bus loop. Total cost of the loop was $760. Under normal conditions, each substation operates independently, separated from the others by open bus ties in the loop. But if one drops out, the plant maintenance man can shift its loads to another substation in ten minutes. Or, by simply closing more ties, he can split the loads among two or all three of the remaining substations.

Some operations justify systems that provide, for every load, one or more alternate power sources—both primary and secondary—and automatic relaying to insure continuous service when power equipment fails. However, small plants may get adequate service at lowest initial cost and least maintenance with the familiar low-voltage radial system, in which low-voltage feeders radiate from a single substation.

• Prefab raceways gain—To reduce field costs of feeders and branch circuits, many designers are using prefabricated raceways and conductors that do not require cutting, threading and cable pulling. An outstanding example is plug-in busduct, consisting of busbars mounted on insulators inside a steel housing. Factory-assembled sections and fittings are bolted together on the job and suspended from the ceiling. Busduct can be disassembled and completely salvaged for re-use. Plug-in openings are spaced about two ft apart on both sides of the duct, making it a simple matter to disconnect, relocate and reconnect production equipment without wiring changes.

Another type of busduct is designed for low impedance. Closely spaced and specially constructed conductors minimize reactance. Low impedance is a desirable characteristic for feeders, particularly long, high-capacity lines where voltage drop must be held down.

Busduct is also available with weatherproof hardware and gasketed steel enclosure for outdoor use, with or without the low-impedance feature.

• Aluminum use gaining—Walter

American Industry rests on

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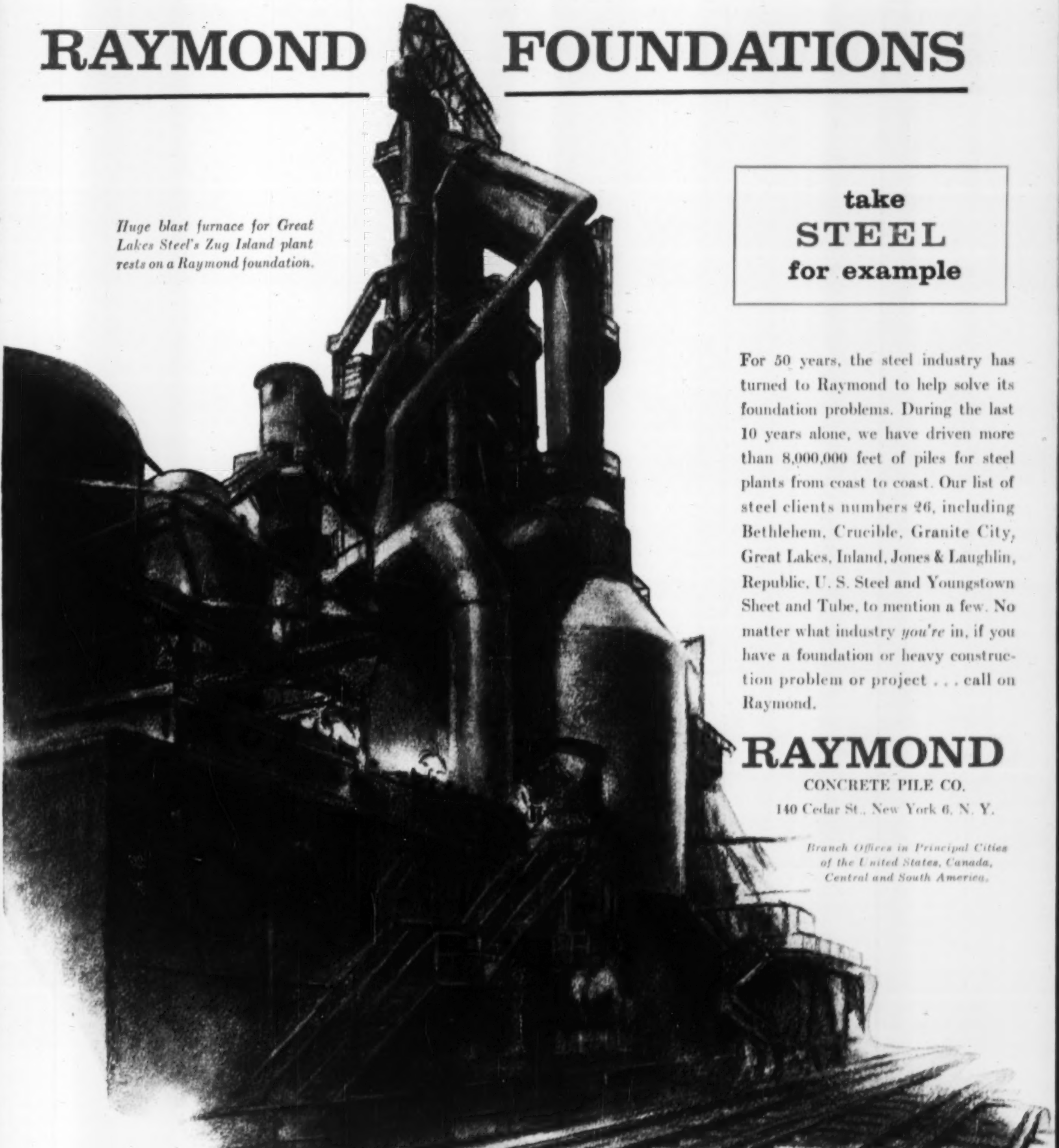

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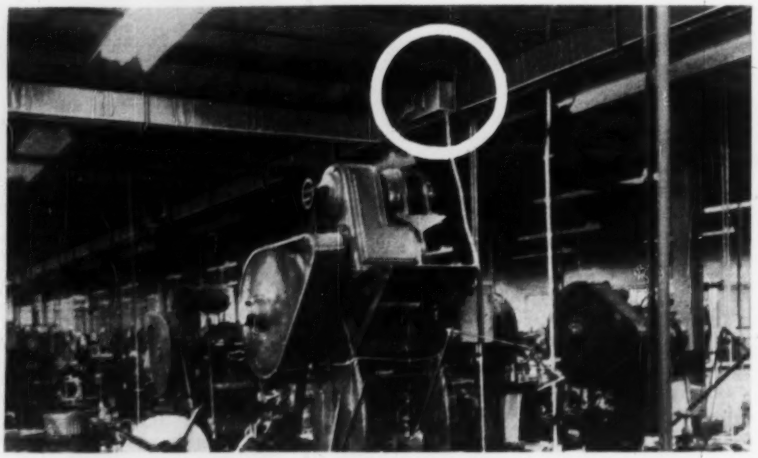

PLUG-IN BUSDUCT makes it easy to shift equipment. The plug-in breaker (circle) is simply opened, unplugged, moved with machine, plugged in at new location and closed.

Kidde Constructors, Inc., in designing both feeder and plug-in busduct for the Hackettstown, N. J., candy plant of Hawley and Hoops, picked aluminum because it checked out cheaper than copper busduct. Where connections are made between aluminum busbars and copper components of the system, special alloy fittings are used to prevent direct contact (and resulting corrosive action) between the two metals.

However, in another installation, Parker Kalon's fastener plant in Delawanna, N. J., the great flexibility of plug-in busduct was not required and Kidde found enclosed metal raceway and cables more economical.

Interlocked-armor cable also cuts job site costs, particularly where runs are devious or obstructions are numerous. Cable and armor are factory-assembled in sections—thus eliminating cable pulling—and the sections can be joined quickly without threading. When the choice lies between interlocked-armor cable and busduct, the former may be found cheaper for feeders carrying less than about 500 amp. Busduct feeders are likely to cost less for heavy current loads.

Some builders are using metal trough or tray to simplify wiring on the job. Cables are simply laid in the troughs, which are suspended from the ceiling. The big advantage is that one raceway can carry a large number of cables. If big enough troughs are provided at the outset, new cables can be added as the plant expands. Other advantages claimed for cable trough include savings of about 50% in site labor (as compared with rigid conduit), small inductive losses, full ventilation (hence, high current ratings), and easy maintenance.

Plastics are gaining too in power-distribution applications. Neoprene-jacketed cables have been buried directly in earth trenches with no metal protection. As cable insulation, many plastics are tough enough to be used without braid. This decreases overall diameter and the space required in raceways or conduit. Stripping is easier without braid, also.

Some plastics, polyvinyl chloride for instance, are highly resistant to acids, alkalies, oils, moisture, and abrasion. The list of plastics is long and still growing. Undoubtedly, their use in electrical systems will increase.

• **Breakers cut costs**—Better circuit protection has saved money for some companies. A Pennsylvania manufacturer trimmed 98% from his $5,000 annual outage overhead simply by replacing fuses with circuit breakers. Another firm reduced its yearly bill from $5,400 to $90 the same way.

Bigger motors and costlier equipment require extra protection against short-circuit damage. Current-limiting fuses often fill the bill. Silver-sand fuses can melt in substantially less than a half cycle, thus opening the circuit before the fault current reaches a peak. The greater the rate of current rise, the faster the fuse melts.

Properly selected, a breaker and a current-limiting fuse act as a team, the breaker handling all fault currents within its capacity, while the fuse stands by to interrupt currents above the breaker's range. This teamwork holds downtime to a minimum.

Selective relaying may cut downtime too. Silicones Division, Union Carbide and Carbon Corp., has a timed system of protective devices that interrupts the minimum of service in case of a circuit fault at the company's Long Reach, W. Va., plant. A motor fuse goes first, followed successively—until the fault is

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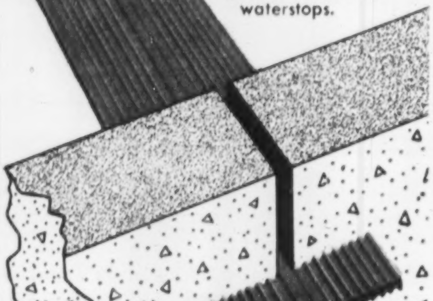

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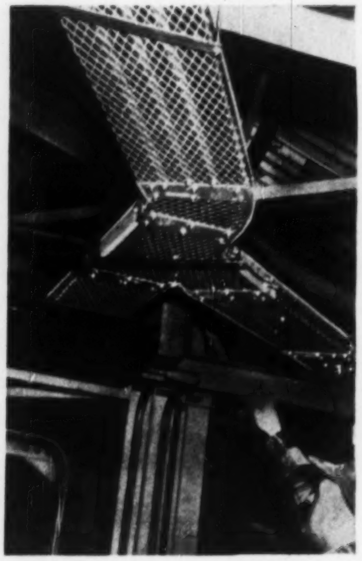

CABLE TROUGH speeds wiring. Cables lit exposed in expanded metal raceways.

isolated—by breakers on the 480-v feeder, 480-v transformer, 4.16-kv feeder, 4.16-kv transformer, and the 13.2-kv feeder.

Downtime reduction was a bonus for Central Soya Co., Inc., and McMillen Feed Mills, when they installed 75 capacitors to correct the power factor at their Chattanooga plant. Besides boosting the power factor from 73% to 96%, the capacitors also fill in fraction-of-a-second voltage drops that would otherwise cause magnetic starters to drop out.

• **Automation coming**—Better controls are part of the general improvement in power planning. Low-voltage remote-control systems are often favored where a number of control points are necessary, particularly if utilization voltages are high. Some operations require centralized controls.

Garden State Mower Co., Division of U. S. Hammered Piston Ring Co., New Providence, N. J., installed an IBM central control unit that can start or stop any piece of equipment in the plant, at any predetermined time. And with no special control wiring. The unit superimposes command signals of various frequencies directly on the plant wiring. The signals actuate coded relays, each of which responds only to its assigned frequency. The relays operate motor switches.

Automation, already here for some plants and on the increase generally, will require many variations of such controls. And with industry relying more every day on electric power, it is a safe bet that there will be no let up in efforts to raise the efficiency and lower the cost of getting it to the job.

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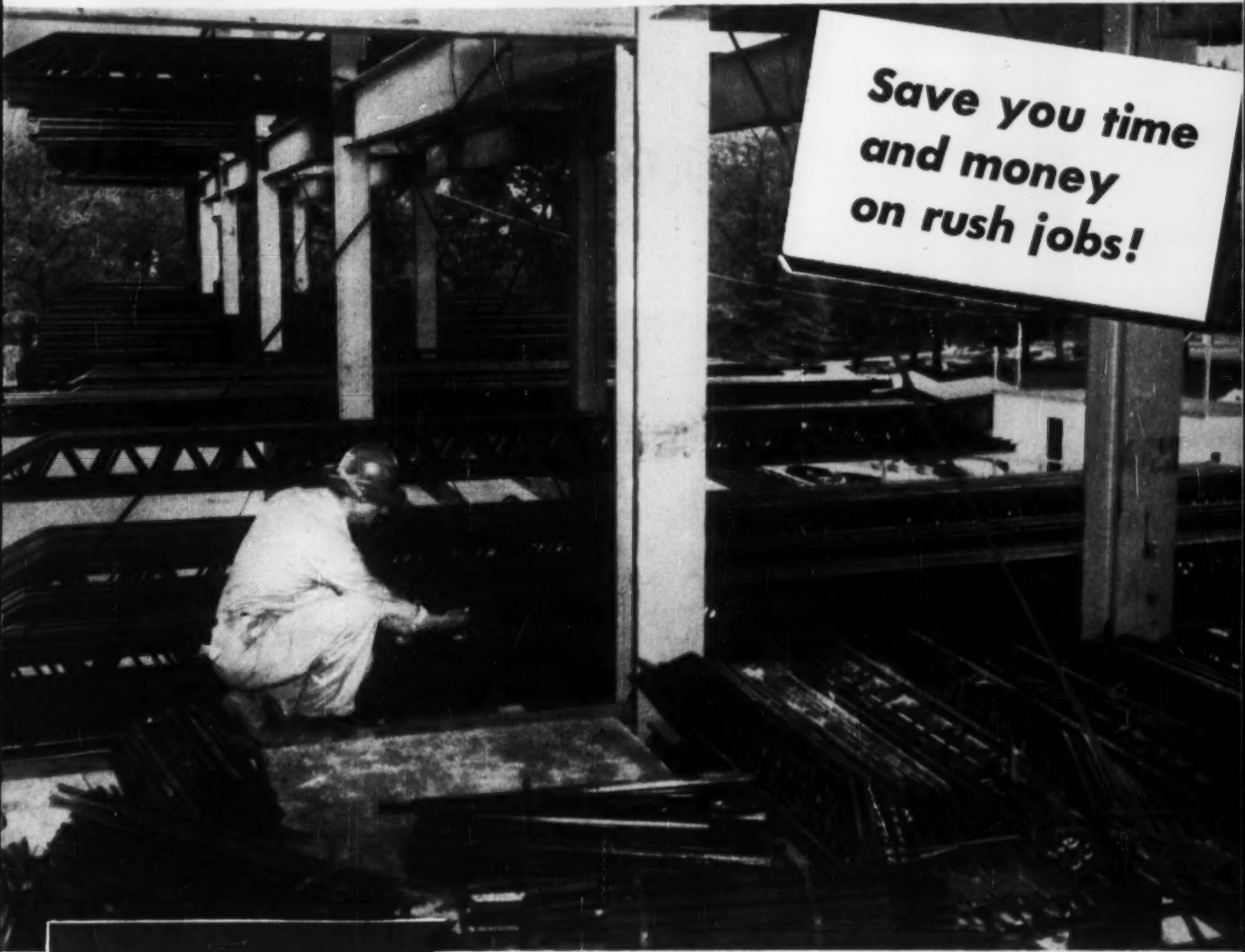

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AMBRIDGE STEEL JOISTS

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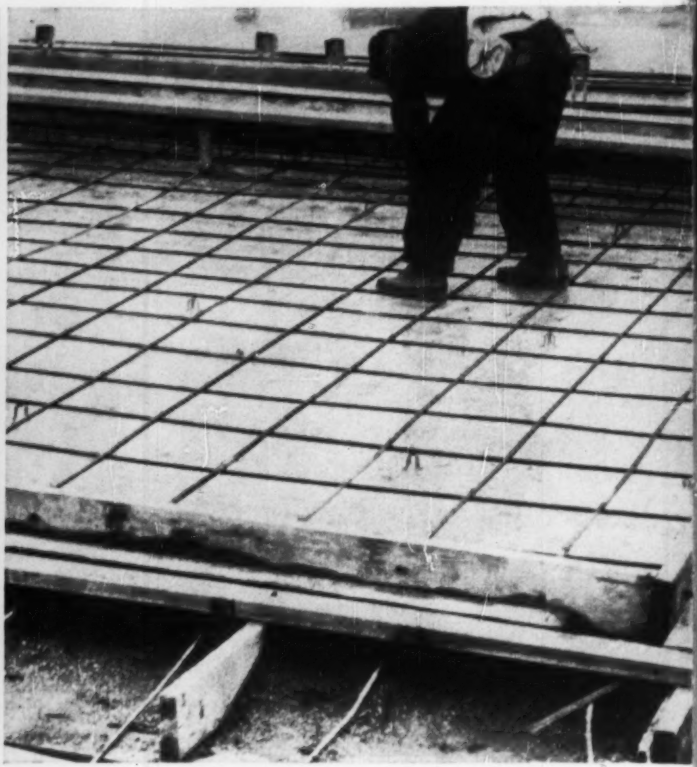
tips on new tilt-up construction technique

① **Base slab** is swept clean and flooded with water to help VISQUEEN film cling smoothly. Ordinary pushbrooms take wrinkles out of film. Extra wide VISQUEEN film is used to avoid creases in finished wall.

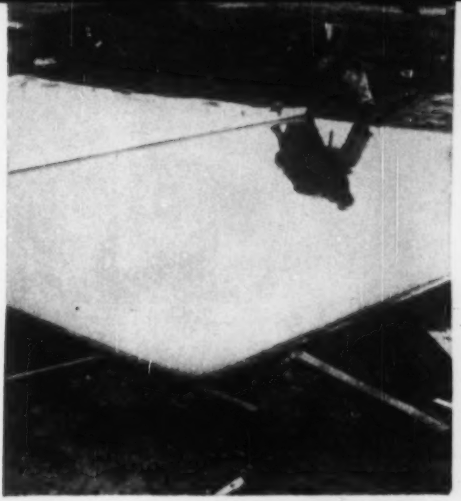


② **New form** is built on base slab. Workmen install reinforcing steel on new form and prepare to pour next slab. A smooth sheet of VISQUEEN film makes a perfect bond-breaking membrane.

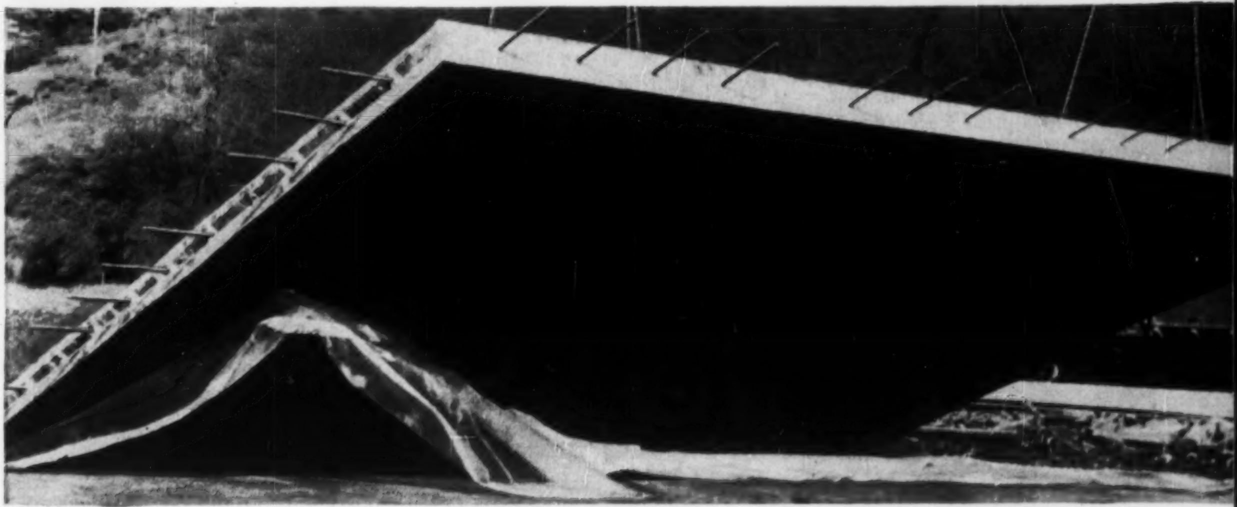
Contractors everywhere find important time and money saving advantages in tilt-up construction methods. Using tough VISQUEEN film as a bond breaker, slabs are lifted quickly, easily. Surfaces are amazingly uniform and reveal a smooth, architectural finish. VISQUEEN film eliminates cracking, sticking and uneven, rough surfaces. What's more, VISQUEEN film is inexpensive. Reduces labor costs, too, because it's so lightweight (1000 sq. ft. of VISQUEEN film weighs less than 10 pounds) and easy to use. Follow the photo story on these pages and see the new advances in tilt-up construction made possible with **VISQUEEN** film.

only VISQUEEN offers *extra* wide widths to make perfect bond-braking membranes.

③ **Minimum time and labor** was required to apply VISQUEEN film bond-breaking membrane and set up new form over base slab. Cement is poured into new form and crew of finishers complete job.



④ **Curing blanket of VISQUEEN film** used to cover newly finished slab. Technique eliminates need for curing compound in cement... prevents checking. No mud dam needed for flooding concrete. No curing compounds to clean up.



⑤ **Finished slabs** are lifted from base slabs and stacked to one side until needed. Notice bond-breaking membrane of VISQUEEN film between each stacked slab. Slabs, separated by VISQUEEN film, break from base easily, quickly and safely.

⑥ **Lightweight, sturdy roof sections** are being constructed by the new tilt-up method, too. Cardboard boxes, strengthened with dividers and covered with VISQUEEN film, are placed in the form and reinforcing steel is stretched above and below boxes. Roof sections are covered with curing blanket of VISQUEEN film for even, strong cure. Finished roof sections are lifted from forms and stacked like wall sections until needed. Notice pre-constructed wall sections in place in background.

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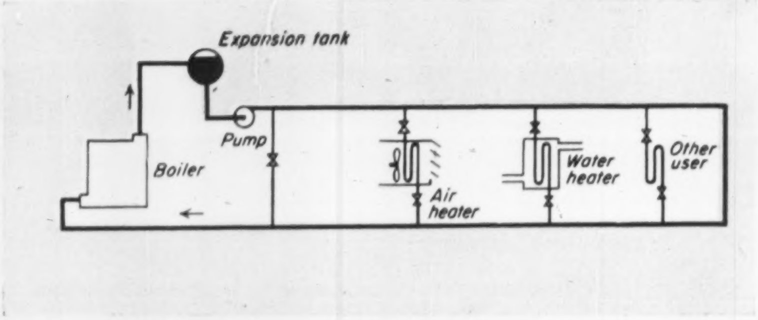
New Ways to Heat and Cool



Better Superheated water system stores more heat, volume for volume, than steam, eliminates flashing and condensate problems, requires less feedwater makeup.

Not too long ago indoor-climate control for industrial buildings consisted merely of opening and closing the windows. Controlled atmospheric conditions were almost entirely limited to plants in which production processes demanded specific conditions. Today, year-round air conditioning—and for comfort, not for maintaining product quality alone—is rapidly gaining recognition as a smart investment. The result is that while most plants are still built without complete air conditioning, few are planned without some thought about installing it later.

The reasons for this trend are simple. First, when labor is scarce, air-conditioned plants have a competitive advantage in recruiting. Excelsior Mills, a rayon tire-cord producer in Clemson, S. C., found this out right after World War II when skilled labor was very short. With complete air conditioning (installed because of the high heat load of production), Excelsior had all the skilled help needed, plus a long waiting list. People wanted to work where it was comfortable.

• Worker output rises—Another sound reason leading some plants to air condition is that personnel efficiency goes up; 25% was the increase estimated for employees in one plant of the Elgin Watch Co. At the same time, product rework dropped a similar amount.

After Sylvania Electric Products, Inc., air conditioned its plant in Huntington, W. Va., last summer, it had the lowest August turnover in the company's history.

Accepting comfort air conditioning as economically sound, industry is installing it in an estimated 15% to 20% of new plant buildings. And according to leading manufacturers of cooling equipment, industrial air-conditioning sales are expected eventually to top all other segments of the market.

G. K. Iwashita, general manager of General Electric Co.'s commercial and industrial air conditioning department, anticipates that by 1960, 80% of all new plants will be completely air conditioned. With similar optimism, Charles V. Fenn, vice president in charge of the Carrier Corp.'s Machinery and Systems Div., predicts that sales of large air-conditioning systems—100 tons and up—will more than double in the next ten years, largely due to the relatively untapped industrial market.

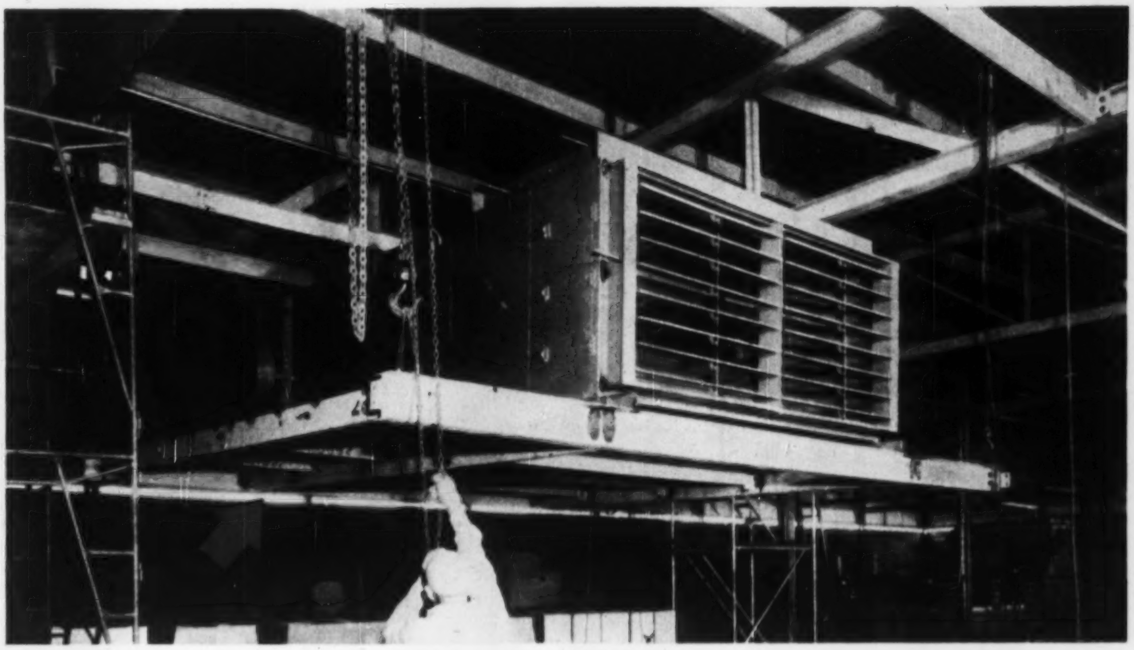
• Designers look ahead—Many new plants now going up with incomplete or no air conditioning have facilities for completing the job later. Seelye, Stevenson, Value and Knecht, New York consulting engineers, planned for eventual installation of 6,000 tons of refrigeration in the International Business Machines factory in Poughkeepsie, N. Y. To date, four 1,000-ton turbine-driven centrifugal machines have been installed. When IBM is ready to expand the system, the space is there, along with facilities for piping condenser cooling water from the Hudson River.

Most large cooling plants built today for air-conditioning systems are the centrifugal compressor type, driven either by electric motors or steam turbines. The choice between steam and electricity is usually made on a strictly economic basis. Low-cost high-pressure steam may swing the designer to turbine-driven units. If electric power is cheap, motors may get the nod. In older buildings, existing facilities—boiler plant, transformers, switchgear—may dictate the choice.

• Absorption coolers gain—New developments in refrigeration, however, are giving the designer a broader selection of equipment. Improved designs and bigger models, for example, are bringing absorption cooling more into the picture for industrial air conditioning. Depending on heat rather than mechanical compression, and with no major moving parts, new pushbutton-controlled units are now made in capacities of several hundred tons.

Where steam is to be produced for heat or power, boiler efficiency might get a boost if absorption coolers are added to the load. They operate on either low or high-pressure steam. In certain localities—New York City, for instance—low-pressure steam operation means that licensed personnel are not needed around the clock, as would be the case with high-pressure steam for turbine-driven centrifugal coolers. Designers of cooling systems for existing buildings frequently have found sufficient steam already available, in some instances being wasted to the atmosphere as turbine exhaust. Absorption coolers also can put idle boilers to work in warm weather.

• New plant to set record—Absorption equipment will be used for the central water-chilling plant to be installed at New York's International Airport. The factors leading to its selection may apply also in industrial planning. First, the supply of available electric power was too small to operate centrifugal compressors, and to run in new lines would have been costly. Second, the heating system was to be high-temperature water.



Faster Air-conditioning units go up speedily with the Austin Co.'s standard procedure of assembling a unit at floor level on a prefabricated platform, then hoisting it into place.

That meant no steam without a sizable outlay for special equipment. As a result, Seelye, Stevenson, Value & Knecht decided on absorption coolers, with hot-water coils supplying the heat.

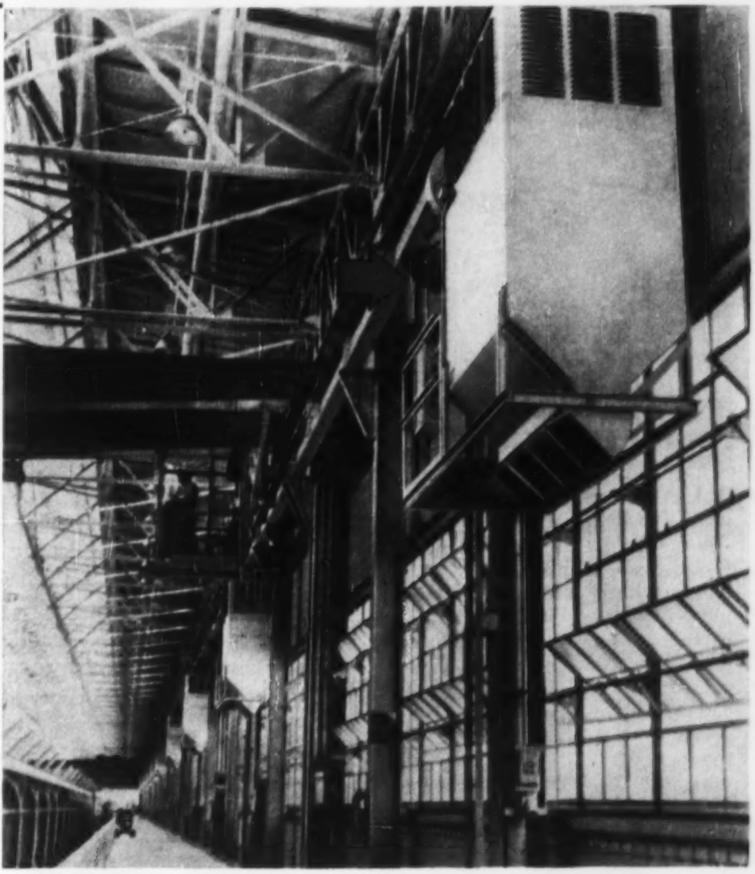
The International Airport system, when complete, will be the world's largest absorption cooling plant. Nine of the Carrier Corp.'s biggest absorption units will give the system a capacity of more than 6,200 tons.

On occasion, total cooling load might control the choice between absorption and centrifugal equipment. An 1,800-ton load, for instance, would require three absorption coolers (maximum size runs around 700 tons). But two 900 or 1,000-ton centrifugals could do the job, and this might give centrifugals the cost edge.

Another possibility, where low-cost high-pressure steam is available, is to power a centrifugal machine with a steam turbine and operate an absorption cooler on back-pressure steam from the turbine.

• Gas people eye market—Gas-operated refrigeration can't be overlooked either. Special rates in some localities are calculated to woo the hot-weather trade. The American Gas Association is sponsoring 13 research projects this year on several types of gas units including a heat pump. Gas-operated units presently available include absorption coolers up to 700 tons capacity.

Chilled-water circulation from re-



Cheaper Individually fired blowers often provide the least costly means of heating high, wide and open spaces. Wall-mounted units, fired with propane, supply low-cost heat for the 6-acre 40-ft-high main building of Wolverine Tube Div., Calumet & Hecla Consolidated Copper Co., Inc., Birmingham, Ala.

frigeration equipment to local coil and fan units is the general trend where large central cooling plants are used. The fan units often include provision also for hot water or steam circulation and for ventilating.

To cut costs, The Austin Co., Cleveland, has installed standardized coil and fan units in buildings totaling more than 15,000,000 sq ft. The units are assembled at floor level on a prefabricated section of the building frame. Then the whole assembly is hoisted into place. Austin units are designed for use with either central plants or individual package coolers.

Many designers prefer all-air systems, with ducts running from the central heating or cooling plant to locally placed diffusers. With ducts and diffusers already in place, warm-air systems convert easily to complete air conditioning. Developments in high-velocity high-pressure circulation of air have trimmed duct sizes to a fraction of those required for low-velocity low-pressure systems.

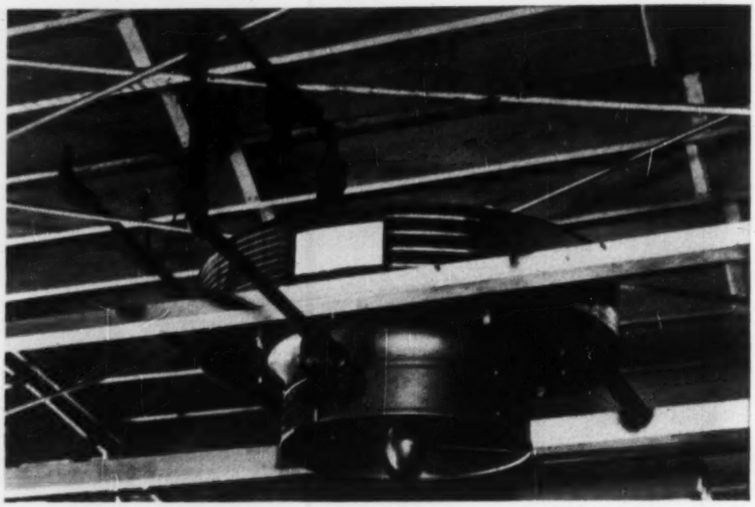
All-air systems have the advantage of eliminating fans, coils and drains from the cooled spaces. And with high-velocity circulation, the air stream sweeps the system clean so that no dirt accumulates.

• Package units are popular—The advantages of direct-expansion packaged units for air conditioning are attracting a growing number of industries. These units now account for more than twice as big a percentage of total non-residential sales as they did in 1950. Frequently, they can be installed in existing buildings without requiring alterations or additional plumbing and electrical services. Space can sometimes be found for a number of these units when a central cooling plant could not be housed without new construction. Proponents of the package system point out also that maintenance shutdowns do not involve an entire plant at one time.

Republic Air Conditioning Co., of Philadelphia, is installing 83 package units in the H. Daroff & Sons clothing plant in that city. The units will be supported on platforms suspended from the ceiling. Standard air-distributor plenums will distribute the conditioned air. Total capacity of the system, due to start operation this summer, will be more than 1,100 tons.

Package units have a particular economic attraction for some companies. If money is not available to air condition completely, the job can be done in easy stages with package units.

Other economy-slanted ideas include the use of tinted window glass and roof sprays or ponds to reduce solar heat gains and, therefore, the required tonnage of the cooling equipment. Even in non-air-conditioned plants, these measures provide some degree of inside comfort.



DOWNBLAST AIR HEATER fed by high-pressure superheated water depends on forced circulation—not gravity. This frees pipes to follow any profile.

Factors influencing selection of methods of air conditioning are sometimes regional in character. In dry sections of the country, for example, evaporative cooling is used extensively. In this method, incoming air passes through washers where humidification of the air lowers its temperature.

• Heat pumps for South—Prevailing climate also limits the practical applications of the heat pump, a device that uses ordinary refrigeration cycles to pump heat either into or out of a building. Most industrial installations are located in areas where average winter temperatures stay well above freezing.

Another common requisite for heat-pump installations is low-cost electric power. Virginia Shoe Co. pays about 8 mills per kwh for the power consumed in cooling and heating its 76x332-ft manufacturing building in Fredericksburg, Va. The job is done by 17 5-ton heat pumps, with automatic switchover from cooling to heating and vice versa.

Some heat pumps are designed for air-to-water heat exchange, but Virginia Shoe chose air-to-air operation to avoid being dependent on ground water.

When heat pumps are installed in severe climates, electric resistance heating is sometimes added to help out during colder spells. This is the case at the New Jersey Power & Light Co. plant, Denville, N. J. The 5-ton heat pump used to air condition the dispatching room can extract sufficient heat from the atmosphere as long as outside temperature is 15 F or higher. When the temperature drops lower, resistance heaters cut in to warm the air circulating around the heat pump evaporator coils.

• Heat pump improved—To avoid the need for supplementary resistance heating, heat pumps with multistage compression have been developed. With this equipment, the minimum outside air temperature at which the heat pump can work efficiently is lower.

A big drawback for heat pumps in northern states is the lack of balance between winter heating and summer cooling loads. Higher requirements for heating would control the capacity of the heat pumps installed, and this would result ordinarily in idle equipment capacity in the summer. This disadvantage is largely removed, in the case of the NJP&L dispatching room, by virtue of its inside location. Other room spaces adjoin the dispatching room on all sides, thus reducing heat losses and gains and approximately balancing the heating and cooling loads. Heat pumps are not used for other cooling and heating in the plant. The dispatching room has 24-hr occupancy, making a separate system desirable.

• Steam does most heating—Heating in industry generally is done by long-established methods. Low-pressure steam with unit heaters is probably the most common. Engineers, builders and maintenance men know the medium and the equipment well.

For buildings with large open work areas and high ceilings, engineers often pick individually fired space heaters. Oil or gas-fired for the most part, some have dual burners so that either

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4...*And, simultaneous operations mean you're under roof—but fast!*

Nat Q. Henderson Elementary School, Houston, Texas. Ralph M. Buffington, A.I.A., Architect; Milton McGinty, F.A.I.A., Coordinating Architect; Spaw-Glass, Inc., General Contractors, Tectum installation by Johnson Construction Specialties, Inc., formerly Macatee, Inc., Houston, Texas.

A GREAT DEAL of design and engineering thought went into the erection of Nat Q. Henderson Elementary School. It's apparent in these photographs and even more evident upon close examination. But, construction was not a long and tedious job—the school was ready for occupancy in a matter of six months. Erection took a logical path, as evidenced by the above photograph of the Tectum installation. Just look at the operations that were performed simultaneously: (1) Tectum is laid over bar joists; (2) grouting is applied; (3) tar paper is secured; (4) built-up roofing and gravel complete the job!

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fuel can be used. Multiple nozzles direct high-speed air streams according to needs—in several directions if desired. Short ducts to outside intakes provide for air changes, with automatically controlled dampers for proportioning outside and inside air. In warm weather, the blowers can be operated without the burners.

The Wolverine Tube Div. of the Calumet & Hecla Consolidated Copper Co., Inc., heats the 6-acre 40-ft-high main building of its Birmingham, Ala., plant with 30 of these heaters. Total hourly output of the propane-fired heaters is 34-million Btu. Only 4 of the units take in outside air. The remaining 26 recirculate room air. Besides the heaters in the main building, Wolverine also uses 7 more, with 12 million Btu per hr capacity, to heat adjoining areas and separate buildings.

• **Keep concrete work going**—Individually fired heaters are particularly well suited for temporary heating. Ford Motor Co. used six of them, with a total capacity of 10 million Btu per hr, to keep zero weather from holding up concrete work during construction of a 900x900-ft engine factory in Cleveland. Skid-mounted for easy moving, each heater was equipped with a 250-gal oil tank. Used to warm half the building at a time, the six heaters kept the inside temperature up to 40 F.

• **High-temperature water** — Superheated water—under high pressure to keep it in the liquid state—is catching the eye of a growing number of engineers and builders as a heating medium. With no steam in the system (except a small amount allowed to flash in an expansion tank to keep the water under pressure) condensate returns, drip lines, traps and pressure reducing valves are eliminated. Pipes can follow terrain since the entire system is closed, with pumps providing forced circulation.

Also, since water at, say, 175 psi absolute pressure and 370 F stores about 20 times as much practically available heat as does steam at the same pressure and temperature, a hot-water system can have smaller pipes and boiler and still store enough heat to handle fluctuating and peak loads efficiently.

Because the same water is circulated repeatedly, makeup water amounts to perhaps a tenth of the volume required for steam systems. This is important not only because it saves water, but also because it reduces feed-water treating equipment, corrosion and scale in the system, and blow-down losses.

The Air Force was the first big-scale user of high-temperature water in this country, though it has been used extensively for years in Europe. The Air Force tried it after World War II, now has heating systems of this type in operation at a number of bases.

For space heating, high-temperature water can be circulated directly through unit-heater coils, or it can supply—by means of heat exchangers—low temperature low-pressure water for separate circulation.

The American Hydrotherm Corp., heating engineers, Long Island City, N. Y., incorporated both methods in a system for Reaction Motors, Denville, N. J. Some finned convectors circulate low-temperature water, but most space is heated by downblast unit heaters with high-temperature coils. Temperature drops across heaters range from 120 to 150 F. Two 500-hp boilers (33 million Btu per hr total) generate the hot water.

Even when steam is required, high-temperature water systems are not necessarily ruled out. Where high-pressure steam is generated for power, turbine exhaust can be used to generate hot water in a separate closed system. If low-pressure steam is needed, it can be produced by means of hot-water-to-steam exchangers.

Walter Kidde Constructors incorporated hot-water-to-steam exchangers in the system designed for the Johnson & Johnson plant now under construction in North Brunswick, N. J. Other loads on the system include space heating with both low and high-temperature water, by means of finned convectors and unit heaters.

• **Mile-long mains**—The J & J system, with two forced-circulation boilers, will have an hourly capacity of 80 million Btu. Temperatures range up to 427 F, pressures to 400 psi absolute. Transmission distances are as great as 5,000 ft. Pipes are weldable carbon steel, mostly inside the buildings and suspended from structural steel frame members.

The time may not be far distant when industrial buildings will be climate controlled by methods now in experimental stages. Solar heating has possibilities, though present attempts are directed mainly at residential applications. Finn J. Larsen, director of Minneapolis-Honeywell's research institute, foresees the possible use of nuclear reactors as central heating plants, without intermediate conversion of the heat to electric power. Electronic cooling, based on the Peltier effect, has been accomplished in the laboratory. These ideas may seem far-fetched now. But so did today's commonplace—yesterday.

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Patient comfort always is a consideration in the building of a hospital. But when architect Leo A. Daly designed the Bishop Clarkson Memorial Hospital, Omaha, Nebraska, *special emphasis* was given that factor. Hal G. Perrin, administrator, and Robert H. Storz, chairman of the building committee, consulted with architect Daly . . . patients were queried . . . all agreed that noise, daylighting and ventilation should come in for critical study. The soundproof characteristics of Ceco-Meyer Concrete Joist Construction and the daylighting and ventilating advantages of Ceco Windows met the requirements. Architect Daly made this further comment on the building method: "This construction is light in weight, but affords exceptional stiffness because of additional depth provided by the monolithic floor and joist section."

Bishop Clarkson Memorial Hospital, selected as the "Hospital of the Year."
Leo A. Daly Co., Architects and Engineers: Peter Kiewit Sons' Co., Contractors

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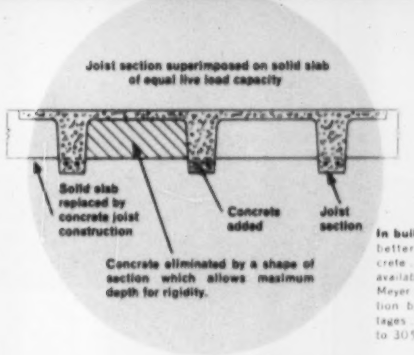
Joist section superimposed on solid slab of equal live load capacity
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Concrete added
Joist section
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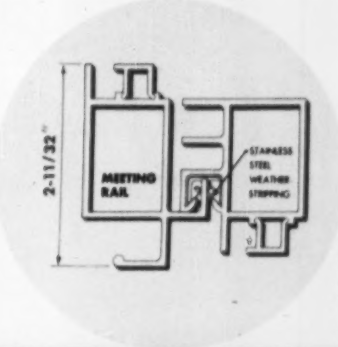
Ceco-Sterling Series 200-B Window — Ceco-Sterling Double-Hung Windows assure minimum air infiltration. Sash float on stainless steel weather-stripping, providing tight but easy operating, silent windows.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Meeting Rail Section, Series 200-B Window — Heavy extruded box sections assure rugged performance . . . double contact stainless steel weather-stripping provides tightness. Weatherstrip at jambs gives a spring cushion sliding contact.

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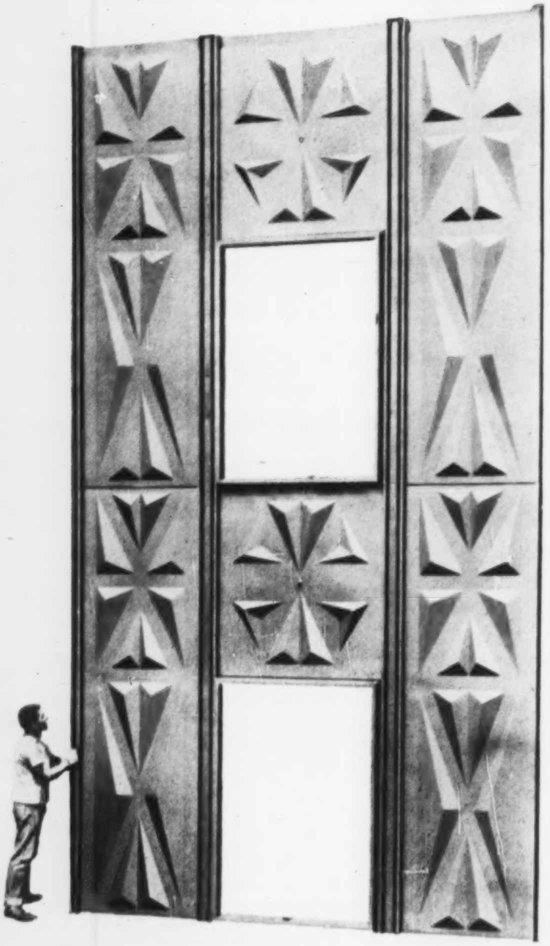

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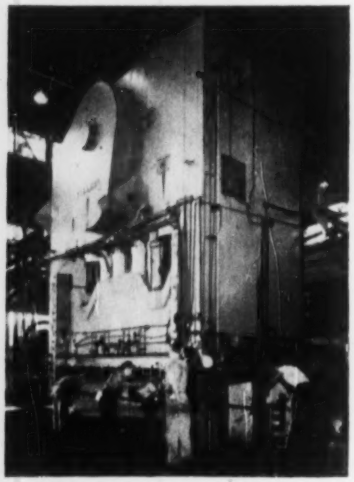

- 2000 ton press over 4 stories in height forms any size ornamental panel in varying dimensions up to 7' by 15½' from any suitable metal.

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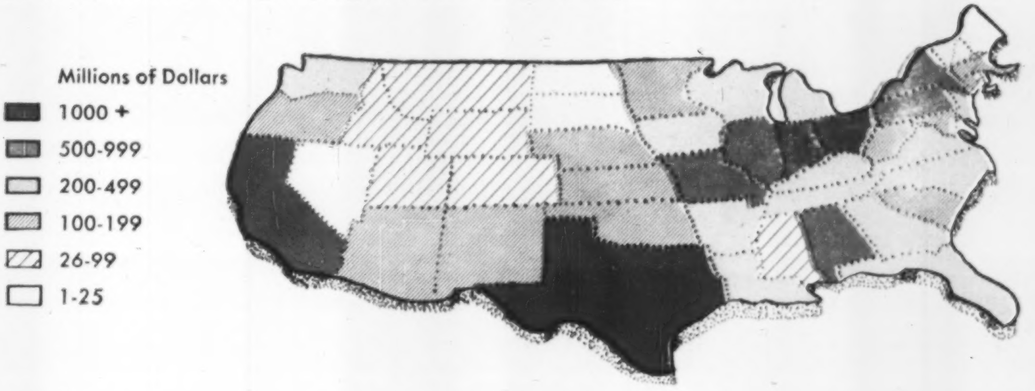
U. S. Plans for New Industrial Building



Here's Where the Boom Is Heading

U. S. industry is calling upon designers and contractors to build new plant at a rate that is without parallel in peace or war.

The current pace is outstripping even the previous record year of 1951 when contracts were let for more than $4.1 billion worth of private industrial building, reflecting the defense needs of the Korean War.

For the first half of this year, contracts for private industrial building averaged more than $110 million a week. A new record will be set this year even if contracts for the balance of the year fall to only half the rate set in the first six months.

This is the crest of the biggest wave of private industrial building in the nation's history. In the six and one-half years from Jan. 1, 1950 to date, private industrial building contracts exceeded the total for the entire 24-year period from 1926 to 1949 inclusive—in constant 1926 dollars.

• Who's building and why?—Public utilities and the process industries have been the spark plugs of the Fabulous Fifties in private industrial building, with a strong assist from the metals refining and rolling group.

Behind the boom in public utility construction have been such diverse factors as the postwar exodus to Suburbia, which created new communities in some cases and new markets for virtually all utilities; the defense needs of the Korean War; the post-Korea industrial boom, the abnormal demands for electricity and other utility services as many industries operated at or near capacity and the growth of such comparatively new power-hungry industries as aluminum.

Modernization and expansion programs deferred during the Thirties and then curtailed by World War II created some of the pressure for a gigantic wave of construction by the utilities. But more than that, the growth of the economy in the past ten years has been so rapid that utilities, which traditionally plan their area's requirements many years in advance, found themselves building just to stay a step or two ahead of current demand.

This demand, in turn, has built up in large part from such process industries as chemicals, petroleum, aluminum and the whole field of petrochemicals. The process industries still are leading the parade.

In the first five months of this year, private industrial contracts in the process industries totaled $790 million. That's more—in five months—than in the entire years of 1950 or 1954. Just as the expansion programs in the utility field promise to get bigger in the future, so do the process industries.

Metals refining, dominated by the iron and steel industry, is in the midst of another major expansion, its biggest since 1951 when the Korean War and the incentives of the fast tax amortization program combined to push awards for this field to $862.9 million.

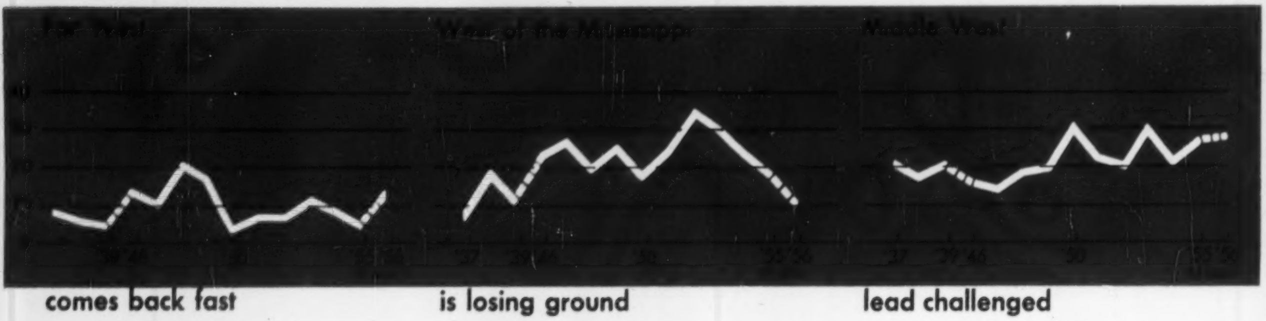
In the first half of this year, contracts for new plant soared to nearly one-half a billion dollars indicating that a new record may be in the offing for the metals refining group this year.

The enormity of the utility, process industry and metals refining construction program is impressive, but other programs also are worth noting. Machinery manufacturers, automakers, and the food industry have been buying new plant at a rapid rate for several years and are still doing so. New methods of processing or manufacturing, improvements in production machinery and more efficient plants have had an impact on this group and will continue to encourage expansion in this field in the next few years.

• Outlook is good—Although industrial building contracts have climbed higher in every successive quarter for the past two years, there are still no signs of a leveling-off. The evidence, instead, points to a continued rise. That does not rule out the possibility of some "dips" developing in contract volume, however.

Demand is mounting every month for new industrial plant. ENR's backlog of proposed private industrial building soared from $11.7 billion to $14.3 billion last year. And, since Dec. 31, 1955, the backlog has

How Industrial Construction Shifts
(Percent of Total U. S. Industrial Contracts



comes back fast **is losing ground** **lead challenged**

pushed to a new high of $16 billion. That's enough work to keep designers and contractors busy for four years even operating at today's record rate.

With the economy in high gear, with some industries operating near capacity and with population still rising rapidly to bulge the future ranks of consumers, businessmen obviously are planning today the plants they will need tomorrow. They are buying land, retaining architects or engineers, making a variety of future commitments that show up in ENR's backlog of proposed work this year—and will turn up as contract awards in the next few years.

• **Where future plants will go**—Overall need for new industrial plant is outlined in the backlog. This buildup of proposed work, compiled on a state-by-state basis, shows industry is on the move, and—important to designers and contractors—it shows where future industrial expansion is most likely to come.

"Hot prospects" are the Far West, South and Middle West, all of which have had sharp increases in their proposed work backlogs during the past year or two. These areas appear to have the strongest backing for a sustained industrial building boom.

The highly-diversified industry of the Middle West gives that area a big boost in a time of general expansion by U. S. industry. And, the five-state area (Ohio, Illinois, Indiana, Wisconsin and Michigan) has solid future prospects because of the heavy concentration of such big construction spenders as the steel industry and the automobile industry. The Middle West now has more than $3.8 billion worth of future work in its industrial building backlog.

The South, which started its industrial renaissance during World War II, continues to be a magnet for industries planning new facilities. The backlog of proposed private industrial work in this region tops the $3.1 billion mark, giving it a bigger potential than the already heavily-industrialized Middle Atlantic region, for example.

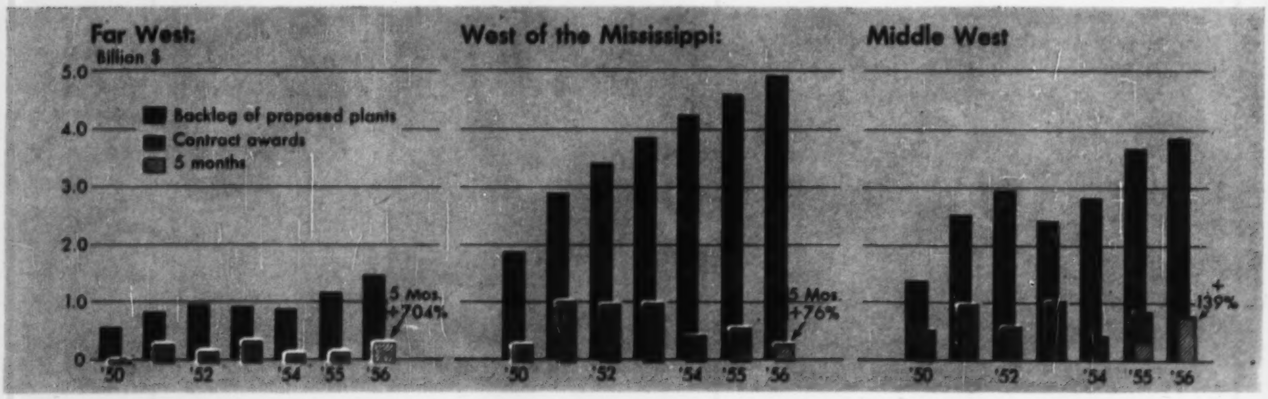
Unlike some of the other areas, where one or two states dominate, distribution of industry is widespread throughout the eleven states of Virginia, W. Virginia, N. and S. Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, Kentucky and Tennessee.

The record-shattering pace of contract awards in the Far West this year is supported by a heavy buildup in proposed work not only in California, which accounts for a major share of the area's activity, but for Idaho, Utah, Arizona, Nevada, Washington and Oregon, as well.

The Middle Atlantic region (which includes New York, New Jersey, Pennsylvania, Maryland and Delaware) is currently the second biggest region in dollar value of contract awards for new industrial plant. But in proposed work, its $2.2 billion worth of industrial building trails such areas as the Middle West, South and the West of the Mississippi.

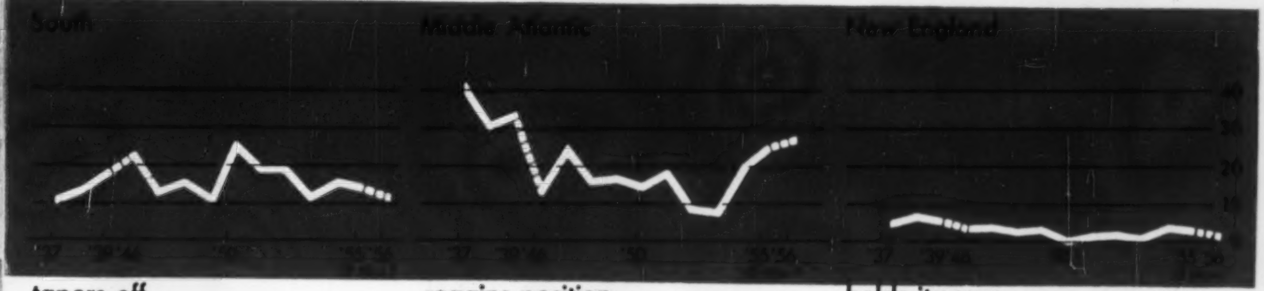
Size of the backlog alone, of course, is not the only thing to watch in picking the areas that will be the biggest buyers of industrial buildings. The West of the Mississippi region is a good example. It has the biggest backlog of industrial building in the nation—$4.9 billion worth of projects that are now in the planning stage. But, the rush of new work that was characteristic of the area even a year or two ago has slowed down.

Industrial Building Boom Hits
. . . and Rising Backlogs of Proposed Plants



From One Region to Another—1938 to 1956

Awarded in Each Region)



tapers off

regains position

holds its own

The West of the Mississippi region gets much of its present drive and its future potential from Texas, although there are other possible "fireballs" among the other states in the region, which includes Minnesota, Iowa, Missouri, Arkansas, North and South Dakota, Nebraska, Oklahoma, Montana, Wyoming, Colorado and New Mexico.

New England, enjoying the best run of industrial building contracts in years, is showing some pickup in its backlog of proposed work. But the dollar value of the work involved is small in comparison with the other regions.

• **Older regions handicapped**—ENR's scorecard of future industrial projects seems to indicate that American business is following movement of population south and west. As a market for designers and builders of industrial plant, the Atlantic Seaboard does not hold the same promise that other regions do. But the older, established industrial complex of the nation is not dead. The factors that made it strong are for the most part still present. Success in the past, in fact, may be its greatest handicap now because its heavy industrial concentration has left the area comparatively short of the cheap land needed for big industrial plants, its highly-skilled and highly-unionized labor pool is often more highly-paid than in newer industrial areas, and the large metropolitan areas that go hand in hand with the manufacturing concentration of the East also present for industry the problems of traffic congestion and high taxes.

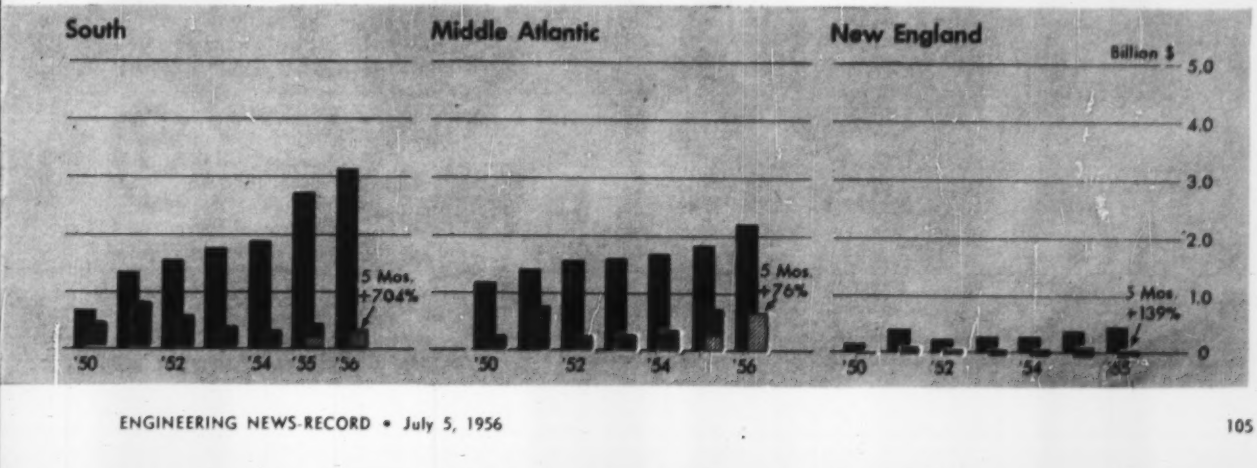
With all their disadvantages, the built-up, heavily-populated metropolitan areas still present the biggest markets. The situation then is not one of some sections killing off others. It is more a question of some growing more quickly than others—but all growing.

Implicit in these expansion plans is the belief that the economy will prosper, that population will continue to spurt, that the nation's standard of living will move even higher. These factors combine to assure the market for manufactured goods that must be the basis of any continued industrial building boom. The three exist now and if history is a guide, they will continue to exist for a long time to come.

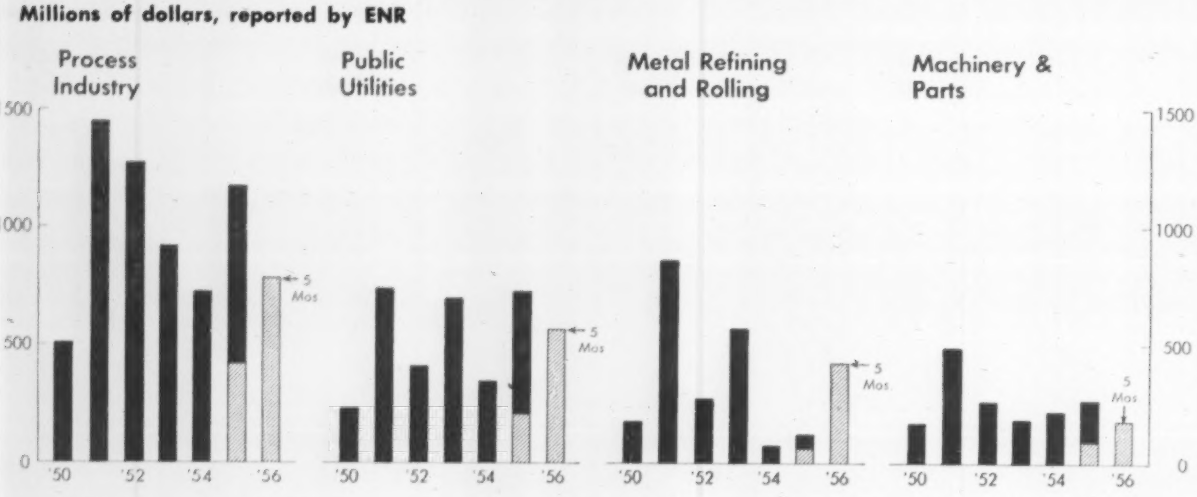
How quickly business will translate these future industrial building plans into reality is another matter. Although U.S. industry has firm intentions of spending some $39 billion this year for plant and equipment, according to the latest survey of the McGraw-Hill Department of Economics, there is some question about fulfilling this goal because of the threat of serious materials shortages.

• **Industry funds run low**—Financing also must be taken into account. Until this year, the bulk of the industrial building boom of the Fifties was financed internally by companies through retained earnings and amortization allowances. (The only notable exception to this has been the public utility field.) Now, many manufacturers have exhausted their internal financing resources and must seek outside financing through long-term loans, or sale of stocks, bonds or debentures. And, that means that industrial building for the first time in many years must compete actively with all other types of construction in the money market. As long as business

All Regions—Some More Than Others . . . Should Sustain the Boom.



Contracts Awarded by Various Industries for



profits remain high, however, such financing should be available for industry in general, although individual companies may hit snags from time to time in raising money for their construction programs.

The cost of borrowing money probably will be watched carefully by expansion-minded industrialists since a difference of 1% in interest costs can become a substantial item on long-term borrowing of millions of dollars.

• Costs continue up—Meanwhile construction costs have risen almost steadily since 1950. ENR's Building Cost Index, which measures the prices of certain key materials plus wages for selected building trades, has climbed 37% from Jan. 1, 1950 to June 1, 1956. The Marshall & Stevens Industrial Building Cost Index, went up 36% from Jan. 1, 1950 to March 1956, while the Marshall & Stevens Industrial Equipment Index jumped 26% in the same period. And, three contractor price indexes for industrial building—Aberthaw, Austin and Fruin-Colnon showed an average increase of 32%. These include not only labor and materials costs but contractors' overhead and profit, as well.

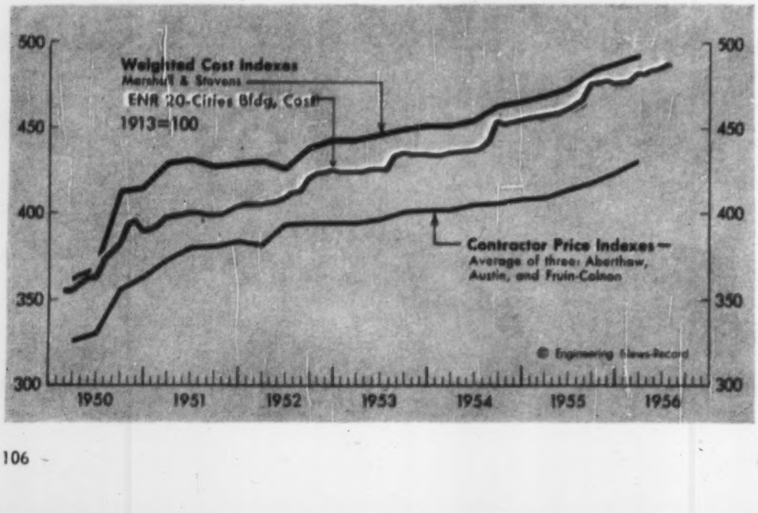
Summed up, it means an industrial plant that would have cost $10 million in 1950 would cost from $13.2 million to $13.7 million today. And, owners who are aware of this long-term upswing in costs realize that the sooner they can get their projects under way, the less they will have to pay for them. That doesn't mean that businessmen are rushing pell mell into their construction programs, without careful planning. They are not only carefully analyzing their markets in advance, but they are also devoting more time to the problem of where they will build their plant—the amount of land available and the advantages and disadvantages of the site itself. How businessmen rate site location factors is shown clearly in an ENR survey just completed.

• How sites are picked—The Big Four factors in site selection—proximity to markets, raw materials, labor supply and transportation facilities—are just as important as ever. But to these, industry now adds other requirements, many of which have a direct effect on the men who design and build the plants.

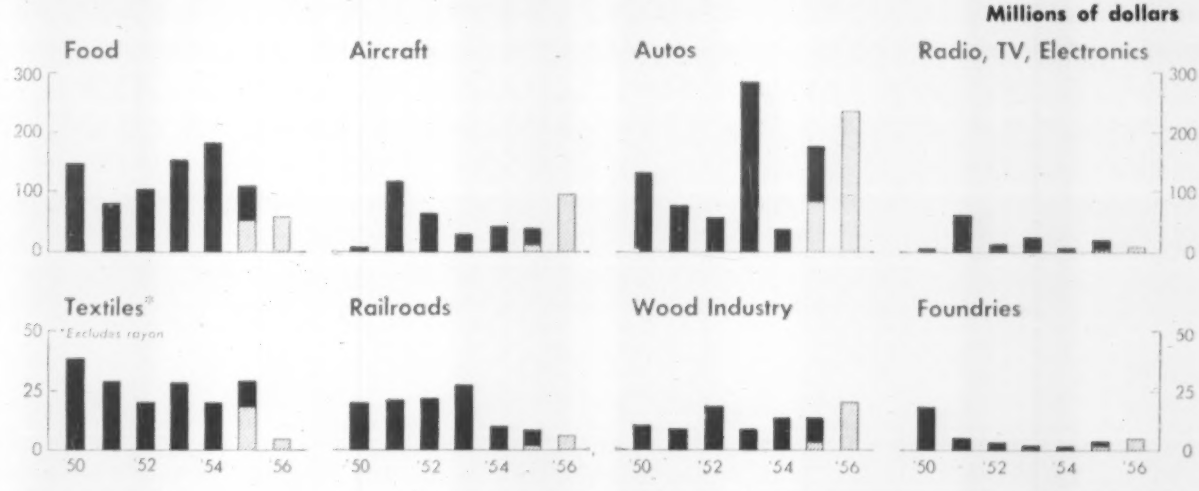
Of the Big Four, the supply of labor—and its cost—appears to be far and away the most important on the basis of the ENR survey. Industry wants to know how large a pool of labor is available, its special skills, its wage rates, its productivity, and in some cases extent of unionization.

While all those responding to the survey agreed on the four basic requirements, many of them singled out transportation for special consideration. In some areas, this was tied closely to the railroads, who have been active in promoting tracts along their rights-of-way for industrial use. But in a few cases, the point was made that many industries no longer rely on the railroads to bring in their raw materials or ship their products. These firms use trucks and have more freedom in selecting their sites be-

Building Materials, Wage Costs Contractor Prices



Industrial Buildings, 1950-56



cause they do not have to build along railroad lines.

• **Industry looks for water**—Aside from these elements, industry appears most concerned about water supply when choosing a location for a new plant. Again and again, this headed the list of requirements.

Automatic equipment used in manufacturing requires more cooling than in the past and there is a greater demand for air conditioning, both for the manufacturing processes and for the comfort of the employees. This seems to account, at least in part, for industry's thirst.

Waste disposal, taxes, the full cost of the land (first cost plus cost of pre-construction improvements), availability and cost of electricity, and living conditions in the community (cost of living, availability of housing, schools, community facilities) and zoning requirements rounded out the list of the biggest factors in site selection.

The study included some surprises. Industry seems less interested in such community inducements as free sites than it is in the attitude of the community toward industry, reflected in local policies, zoning requirements, tax rates and building codes.

Congestion in general and traffic congestion in particular seems to be growing in importance. One plant location was changed—after the site already had been purchased—because a study showed that the new plant would create a fantastic traffic jam at rush hours.

Not surprising was the marked desire of industry for ample "excess" land at the site to insure future expansion in an orderly manner, to provide ample parking facilities, and even to control the type of industry that will move in at some future date as a "neighbor".

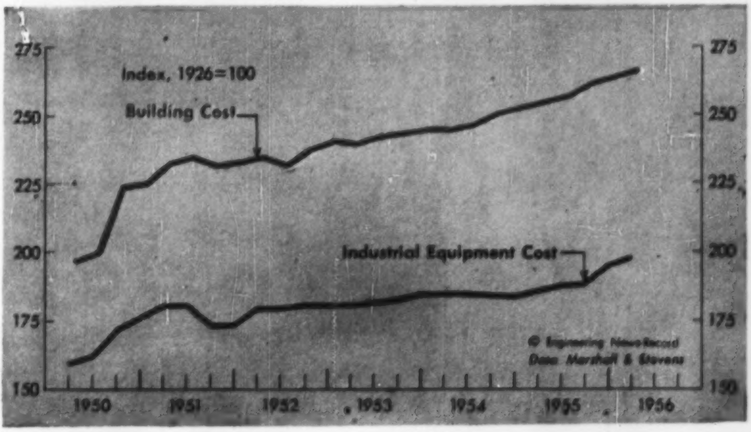
• **How much land to buy**—There was no general agreement, however, on how much land is needed. Some say the land in excess of building requirements runs from a minimum of 65% of the actual building size to roughly four times the building area. Others pick the range at four to five times the actual building size. Best guide seems to be three to four times the building area.

The job of finding the right site seems to fall primarily on the shoulders of the owner, with a strong assist from real estate brokers and sometimes from architects, engineers, railroads, power companies, Chambers of Commerce and similar groups. But, there is a growing tendency to call in site location experts. And, the architects and engineers make a strong bid to get into the project before the site is selected, feeling that they are better able to judge the site.

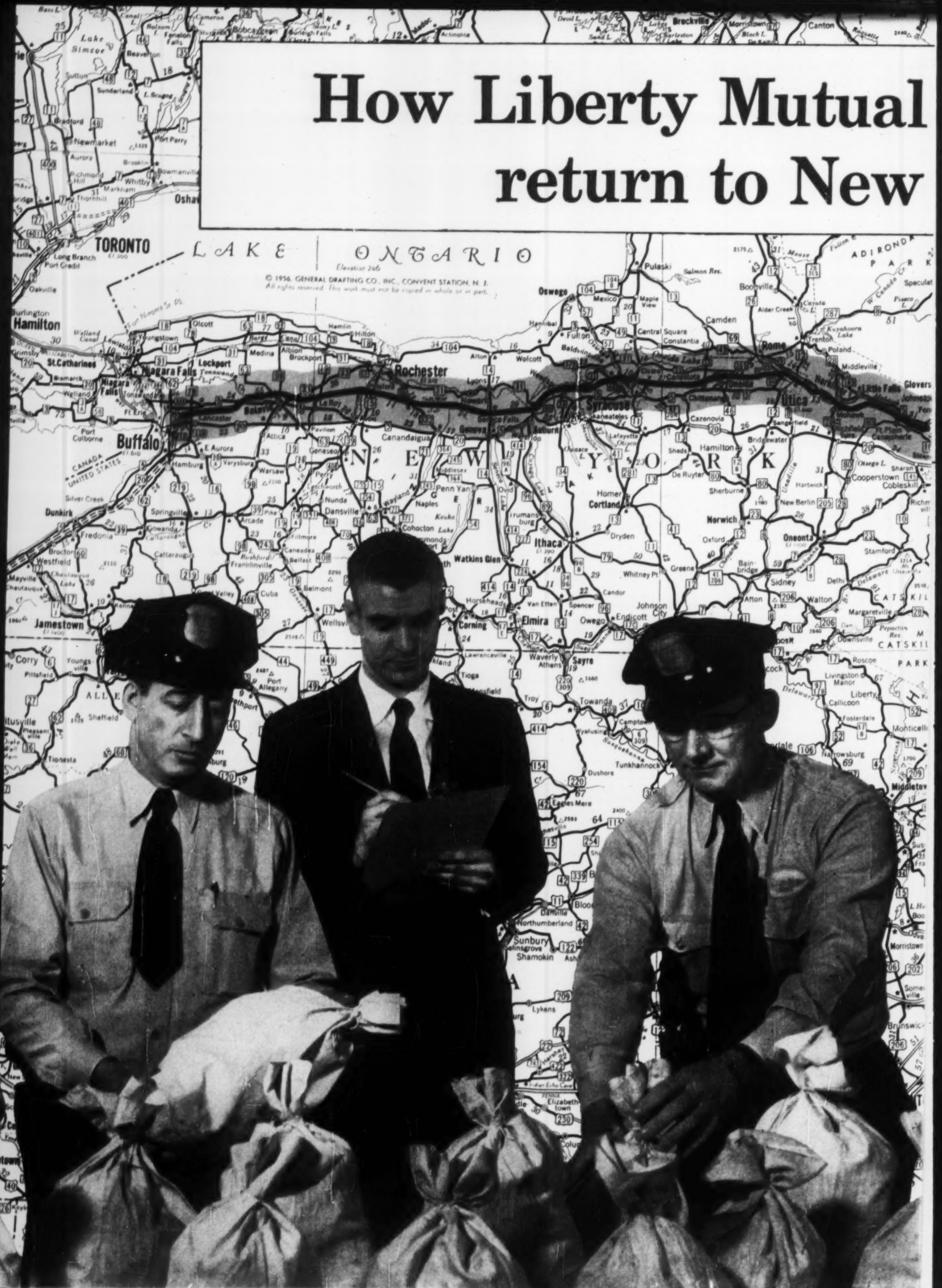
How difficult is it to find sites today with enough land area and with all of the other requirements? Larger sites that pass industry's test are more difficult to get, particularly in the urban areas.

While large, desirable tracts are harder to find, good sites are available—the boom in industrial building won't be stopped by a "land shortage."

Industrial Building Costs vs. Production Equipment Costs



How Liberty Mutual
return to New


LAKE ONTARIO
Elevation 246
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NEW YORK
TORONTO
Buffalo
Rochester
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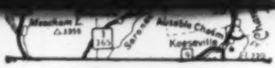
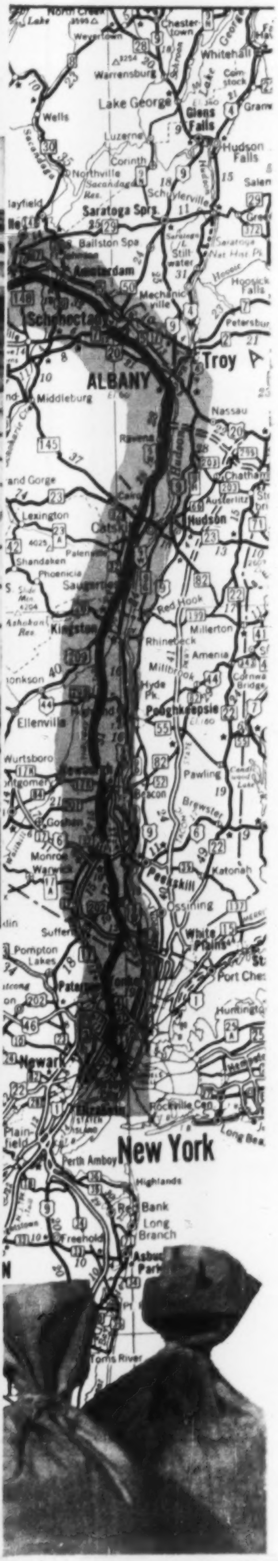
Elmira
ADIRONDACK PARK
CATSKILL PARK



Meacham L.
Keeseville

gave a $1,000,000 premium York Thruway contractors



Warrensburg
Lake George
Glens Falls
Hudson Falls
Saratoga Sprs.
Ballston Spa
Amsterdam
Schenectady
ALBANY
Troy
Middleburg
Nassau
Ravena
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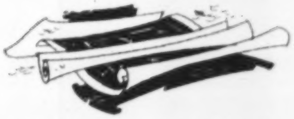
Kingston
Rhinebeck
Millbrook
Hyde Pk.
Poughkeepsie
Ellenville
Newburgh
Beacon
Pawling
Brewster
Goshen
Monroe
Warwick
Peekskill
Katonah
Ossining
White Plains
Port Chester
Pompton Lakes
Paterson
Newark
New York
Perth Amboy
Highlands
Red Bank
Long Branch
Freehold
Asbury Park
Toms River

When the world's biggest toll road sliced through New York — 64% of the mileage was insured by Liberty Mutual. Every contractor on that 200 mile stretch worked with Liberty to put safety first. The result: more than a million dollars in premiums returned to them.

Before work started, Liberty carefully analyzed potential hazards. As the job progressed, Liberty kept on top of problems through six offices between New York and Buffalo. Liberty engineers were always on hand — checking operations, studying traffic, making pre-blasting tests. When men got hurt, Liberty claimsmen were right at the scene, helping to provide the very best medical care.

Service like this — on every kind of construction job — has helped make Liberty Mutual America's largest carrier of Workmen's Compensation Insurance. Best's Reports give Liberty highest rating for financial strength. Liberty Mutual is *the company that stands by you.*

10 WAYS LIBERTY MUTUAL CUTS INSURANCE COSTS ON CONSTRUCTION JOBS



1. ADVANCE ANALYSIS, by Liberty engineers, spots and controls potential hazards before each of your projects begins.

2. ENGINEERS ON THE JOB who keep your men safe, control damages due to blasting, unsafe operating methods, etc.

3. RESEARCH by specialists in Liberty's own laboratory helps solve your difficult problems.

4. AROUND-THE-CLOCK CLAIMS SERVICE — full-time claimsmen on the bigger jobs — assures fast, fair claims handling.

5. ABILITY TO FOLLOW YOUR OPERATIONS — Liberty has branch offices in 146 cities — at your service.

6. SERVICE PERSONNEL live on large projects both here and abroad, plan and guide safety operation.

7. LARGE MEDICAL STAFF, plus three rehabilitation centers, assures the best treatment for injured men.

8. SPEEDY AUDITING service, tailored to your needs, assures proper allocation of payroll classification.

9. YOU DEAL DIRECT with company sales, loss prevention, claims and medical personnel. No middlemen.

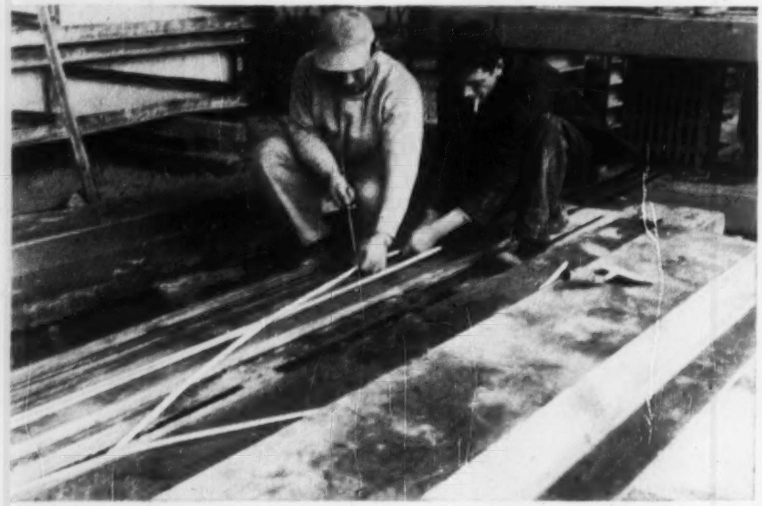
10. INSURANCE AT LOW COST. Liberty's "expense ratio" on Compensation is lower than any other mutual company. Liberty has returned $363,275,898 in dividend savings to policyholders.

For 20 straight years — the nation's largest writer of Workmen's Compensation Insurance

LIBERTY MUTUAL

The Company that stands by you

Liberty Mutual Insurance Company • Liberty Mutual Fire Insurance Company • Home Office: Boston



Plastic Tubing Varies Prestress

Prestress in pretensioned concrete beams can be controlled with a new plastic tubing called Aeroflex. The tubing is used to enclose tendons and prevent bond in regions of the member where less prestress is desired.

Often, in bridge and roof beams, it is important to prevent tensile stresses in top fibers near the supports. At the same time, maximum prestress is needed in the center of the beams. One way to do this would be to have more strands in the center of the members than at either end. The same effect can be accomplished by extending the strands required at midspan through the whole length, then use the tubing to prevent bond between some of the strands and the concrete near the ends.

Aeroflex tubing is an open tube with an overlap of about one-half a circumference. According to the manufacturer, the tubing is speedily applied over strands by opening it and walking along the strand, at the same time pushing the opened tube against the wire. The tube's flexibility makes it self-closing. Manufacturer states that the overlap, installed with outside end down, keeps out concrete and water. ANCHOR PLASTICS CO., L. I. C., N. Y.

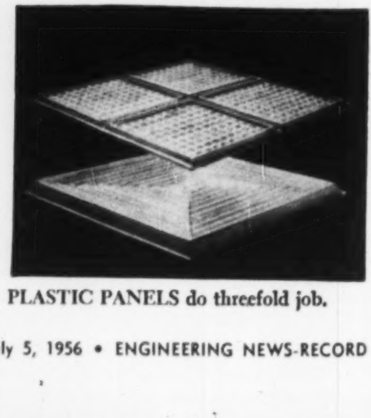
New Plastic Ceiling Panels Diffuse Light, Absorb Sound

Two new series of panels, for luminous ceilings and lighting fixtures, when used together will perform three functions: (1) diffuse light, (2) dissipate sound, and (3) allow air circulation between room and plenum above, if desired.

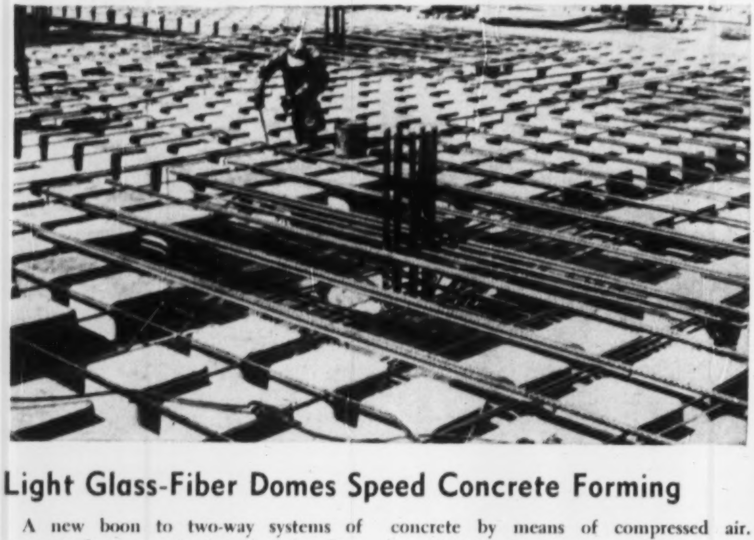
Called ISO panels, the 24 x 24-in. squares have aluminum edges. The upper panel (Iso-lyte series) is of clear vinyl plastic and is designed for light diffusion only. Directly below, separated by a small gap, is the lower panel (Iso-sonic series), which is designed for light diffusion and sound dissipation. Perforations in the lower panels give them their acoustic properties and permit free air circulation between the upper ceiling chambers and room area.

According to the manufacturer, the two-part panels may be separated for cleaning, have consistent whiteness maximum light diffusion, and will not support combustion. An added advantage claimed is that even when forced air circulation is not required, lamps will have prolonged life due to convection currents rising through the luminous ceiling. Each series of panel is subdivided into five types. ISO INDUSTRIES, INC., 1654 LINCOLN BLVD., SANTA MONICA, CALIF.

(New Products continued on page 112)



PLASTIC PANELS do threefold job.



Light Glass-Fiber Domes Speed Concrete Forming

A new boon to two-way systems of concrete floor construction is a glass-fiber dome-shaped form. Available in depths of 8, 10, 12 and 14 in., the domes are said to strip easily because of their flexibility and light weight (7 lb for the 8 and 10-in. size, 7½ lb for the 12 and 14-in. domes). Forms may be released from concrete by means of compressed air. In addition to being noncorrosive and nonconductive, the domes are claimed to be strong, acid resistant and of uniform dimension. Resulting concrete surface has a smooth finish, and domes may be used repeatedly. American Fiberglass Corp., 1010 Euclid Avenue, Cleveland 15, Ohio.

[illegible] powered by an International [illegible]

[illegible] powered by International UD-325.

[illegible]

[illegible] with an International UD-1091.

4 more Bucyrus-Erie owners choose

International® Power Units

...custom-engineered to fit contractors' power needs

More and more contractors, when choosing power for new equipment, or when repowering existing machinery, choose International power units.

One of the big reasons for this swing to International is that these dependable, low-operating-cost units are custom-engineered for contractors' power needs. Engines are available in a wide choice of combinations to fit construction equipment applications. Performance characteristics can be adapted to match special applications.

But no matter how you specify your International engine, you get famous in-built advantages. Most important of these, to shovel users, is the instantly responsive power. As shovel crowd or digging action demands more torque...it's there, instantly. Here's why. Four-cycle design plus fast-acting governor provide the extra fuel required for no-stall lugging in tough, heavy materials.

In addition, you get valve-in-head design, lubrication through rifle-drilled passages, Tocco-hardened crankshafts, full-flow diesel oil filters, and many others, including new gear-driven balancers in the 4-cylinder UD-14A and UD-350 diesel engines for "6-cylinder" smoothness and performance.

So, when your choice of power unit comes up in your next equipment purchase, or when you decide to repower present equipment, specify International—for long-time satisfaction! Your International Power Unit Distributor or dealer is ready with complete job analysis, selection, and installation service... plus the assurance of prompt parts and service availability.

INTERNATIONAL® CONSTRUCTION EQUIPMENT

International Harvester Company
[illegible]

CHOOSE FROM 18 HEAVY-DUTY INTERNATIONAL DIESEL AND CARBURETED ENGINES—FROM 17 TO 214 HP.

See you at the
ROAD SHOW
CHICAGO
Jan. 28 - Feb. 2, 1957

A COMPLETE POWER PACKAGE INCLUDING: Crawler, Wheel, and Pipe-Boom Tractors... Self-Propelled Scrapers and Bottom-Dumps... Tractor and Rubber-Tired Loaders... Off-Highway Trucks... Diesel and Carbureted Engines... Motor Trucks.

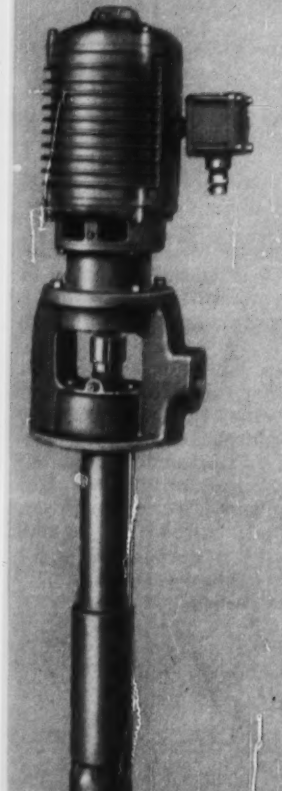
WIDE VARIETY OF LIQUIDS HANDLED BY DEMING INDUSTRIAL SOLVENT PUMPS

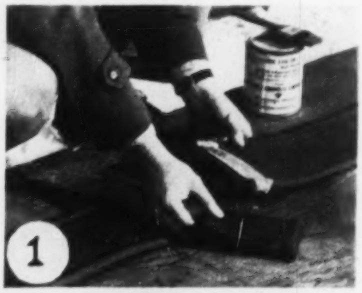
TYPICAL LIQUIDS HANDLED

Acetone
Acetone & Amiplene
Acetate-Acetone
Acetate Anhydride
Alkaline Solution
Ammonia
Amylene
Anti-Freeze
Aviation Gasoline
Benzol
Benzine
Brines (Light)
Butanol
Caustic Soda
Coconut Oil
Diesel Oil
Ethanol
Ethyl Acetate
Ethyl Alcohol
Ethyl Ether
Fuel Oil
Hot Condensate
Hot Paraffin
Hydraulic Oil
Isopropyl Ether
Jet Fuel
Kerosene
Lanolin
Methyl Ethyl Ketone Solvent
Mineral Spirit
Monoethanolamine
Octo Alcohol
Pure Petroleum Naphtha
Sea Water
Sodium Hydroxide Solution
Solvesso
Styrene
Textile Finish Oil
Thinner
Toluene (Crude)
Toluene (Dry)
Vinyl Acetate
Xylene

Advantages of Deming Fig. 4703 pumps include elimination of priming difficulties as the pumping unit is always submerged; minimum space is required due to vertical construction; universal application for handling both volatile and nonvolatile liquids; no close clearances; less piping required; low maintenance and operating cost. For complete information, write to:

THE DEMING COMPANY
536 BROADWAY • SALEM, OHIO

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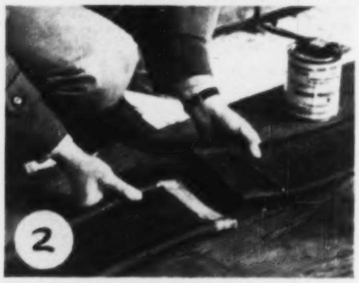
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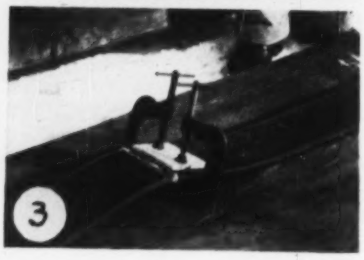

3

New Splicing Method Saves On Cost of Watersealing

Providing an effective waterseal against hydrostatic pressure, rubber waterstops are gaining wider use in many new applications, such as sewage treatment plants, swimming pools, and tunnels. An important detail of their installation is the method of splicing.

Previous splice methods required field vulcanizing, making the water stop an expensive item. A new technique for splicing simplifies the process a good deal. Illustrated above, the splice is installed as follows:

1. Adhesive is applied to the surface of the waterstop and the hollow union, of the same specification rubber as the stop, is pushed on until the dentering web is reached.
2. The adhesive is now applied to the other length of waterstop, which is pushed into the union, joining at the centering web.
3. A C-clamp and blocks apply pressure until the adhesive sets.

The new union was developed by Servicised Products Corp., 6051 W. 65th St., Chicago, Ill.

(New Products continued on page 114)

How to beat a fleet of limited-duty rigs
...WITH ONE
International® Drott 4-IN-1

Beat a power shovel wherever exclusive Drott *triple-power, pry-action break-out* is decisive—and where quick International crawler mobility can out-speed and "out-reach" a boom. Break-out force of the three Four-In-One models as Skid-Shovels ranges from 12,800 to 55,000 lbs!

Gain a 30-inch (or greater) dumping height advantage over ordinary roll-forward bucket dumping—by using the bottom-dump feature of the Four-In-One as a clamshell. And loading with the clamshell action, get a super-fast bucket-fill on stockpiled materials, even in cramped quarters.

Get versatile carry-type scraper action with the Four-In-One in Bullclam position. Using positive clam lip control, spread materials, strip, and grade with amazing accuracy. And as a Bullclam, the Four-In-One *heap-loads* itself with speedy, earth-boiling action!

Get big dozing capacity with finger-tip ease with your Four-In-One in bulldozer position. Regulate dozing depth by hydraulic "radius control" of blade pitch. Note the frost-breaking, earth-moving action. Shown here is new 2¼-yard Four-In-One for the International TD-14.

4 1

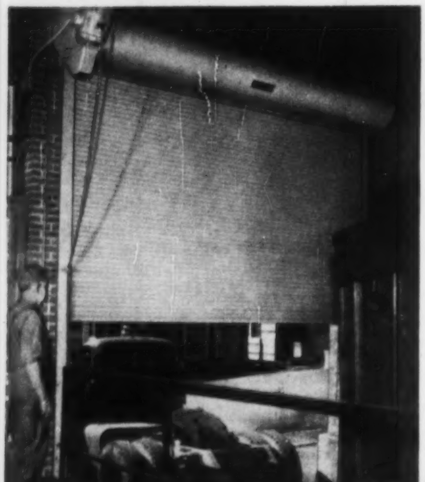
Prove Four-In-One versatility unlimited with the 1-yard TD-6, the 1½-yard TD-9, or the new 2¼-yard TD-14 model. Test *exclusive* pry-over-shoe break-out action, and *exclusive* shock-swallowing Hydro-Spring. Ask your International Drott distributor for a Four-In-One demonstration.

INTERNATIONAL HARVESTER

International Harvester Company, Chicago 1, Illinois

INTERNATIONAL® DROTT

Kinnear Rolling Doors



Here is a **BIG** factor often overlooked by cost-minded business and industry: The floor and wall space . . . the time and labor . . . the upkeep and repair costs you can save with Kinnear Rolling Doors.

Opening straight upward, they coil out of the way. Their rugged, all-metal, heavily galvanized construction withstands hardest use . . . toughest weather conditions. Built any size, with manual or electric operation. Ideal for old or new buildings of any type.

Write for details on Kinnear Rolling Doors—the BIG value in door efficiency.

The KINNEAR Mfg. Co.
FACTORIES:
1820-40 Fields Avenue, Columbus 16, Ohio
1742 Yosemite Ave., San Francisco 24, Calif.
Offices and Agents in All Principal Cities

Saving Ways in Doorways
KINNEAR
ROLLING DOORS

Disposable Fiber Form For Columns and Piers

Designed for low-cost simple forming of piers, short colmns, column footings or pads, a new disposable fiber form is light and easy to handle.

Called Deltaform, it comes to the job packed flat in bundles. It opens into a square form, which assumes a round shape as soon as concrete is poured into it. According to the manufacturer, no bracing is required. Forms are delivered in precut lengths. DELTA CO., 333 W. 24TH PLACE, CHICAGO, ILL.

One-Man Rock Drill

A new model portable, lightweight high-capacity rock drill and breaker—the Pionjar BRH-50—is now available.

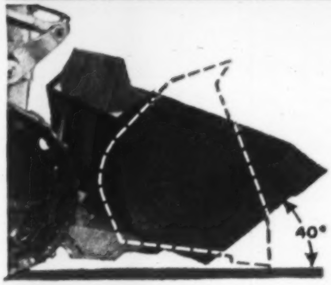
The gasoline-powered drill weighs only 66 lb when fully equipped for operation, yet is said to feature reduced vibration and extraordinary drilling and breaking capacities. The machine is a smaller model of the BRH-65.

According to the manufacturer, the new model's drilling capacity in medium-hard granite is 46 ft per hr with a 1.06-in. bit; 29.5 ft per hr with a 1.34-in. bit. Tests on construction jobs are said to show that the machine can break through 4 to 6 in. of concrete with a minimum of driving.

Lightweight, the machine can be carried by one man over the shoulder or by the handle located at the center of gravity. The machine is manufactured in Sweden, but complete service and spare parts replacement are said to be available throughout the United States. Stanco Mfrs. & Sales, Inc., Los Angeles, Calif.

NOW . . . a loader which combines crawler traction with rubber-tired speed . . . a loader with unmatched visibility plus perfect balance

the all new International® Rear-engine Payloader®



Tremendous pry-out force is obtained by using breakout pads on ground as fulcrum for leverage. Load forces transfer to ground instead of to machine.

40° bucket tip-back at ground level permits digging of bigger bucket loads, plus retaining of more of load in bucket during lifting and carrying.

For *speed, maneuverability*, and *big capacity* in a crawler-loader, see the new International 1¾ yard Model 12 Payloader!

This amazing 77 net hp machine seats its operator *in front of the engine*, close to the bucket, where he can always see what he's loading, and where he's going. It balances the tractor between rear-mounted engine and front-mounted bucket. It distributes weight evenly over entire length of tracks, to give you better traction, longer track life, better stability on grades, less bogging down in spongy ground.

Your operator moves faster on the new Payloader, too. He can go up to *10 mph forward, 13 mph reverse*. He changes speeds or *direction* rapidly through a full-power shift, three-speed, full reversing transmission. He need hardly slow down or reduce engine power to shift gears. He gets maximum digging power from the machine's torque converter. And he steers easily, too, controlling each steering clutch and brake through one power-boosted *lever* (no foot steering brakes).

Try this new International Model 12 Payloader for yourself. Let us arrange a demonstration. Call soon! A good deal awaits you!

See you at the
ROAD SHOW
CHICAGO
Jan. 28-
Feb. 2, 1957

INTERNATIONAL HARVESTER

International® Construction Equipment

International Harvester Company, 180 North Michigan Avenue, Chicago 1, Illinois
A COMPLETE POWER PACKAGE INCLUDING: Crawler, Wheel, and Pipe-Boom Tractors . . . Self-Propelled Scrapers and Bottom-Dumps . . . Tractor and Rubber-Tired Loaders . . . Off-Highway Trucks . . . Diesel and Carbureted Engines . . . Motor Trucks.

PUSH THIS BUTTON...

Bonus-Powered

Try seconds-fast crawler starting. Famous International gasoline conversion, *in-seat* starting is *standard equipment* in all International diesel models! You get fast, positive, all-weather diesel starting, without *fooling* or *fouling!*

Try the lever-pull ease and power-transfer efficiency that new International Cerametallic engine clutch facings give you. And these self-cooling, long-lasting facings are of long-proved, well-known dry-type clutch design. No mystifying seals, circulators or "cold-sensitive" liquid to live with!

Try new International crawler steering. Unrivaled TD-24 Planet Power steering with capacity-boosting power on both tracks is responsive to even a schoolboy's finger-tip touch! New hydraulic booster steering, in the new TD-18 and TD-14, reduces steering lever pull a big 75%. And the new T-6, TD-6, and TD-9 with spring-type steering clutch boosters are 25% easier to steer!

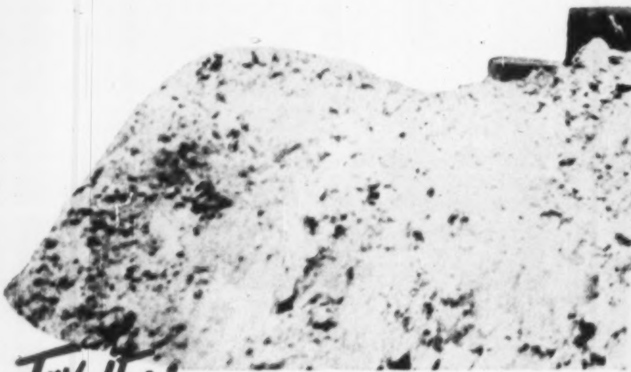
Above all, load up a new International crawler with matched International equipment—prove how bonus-powered performance boosts profit-production, wins operator preference, simplifies servicing. Choose from 7 heavy-duty crawler models, 41.5 drawbar to 200 net engine hp. Have your nearby International Distributor show you the bonus-powered performance package you need! Get a demonstration on your job today!

Try it..

a new Dirt-Heaping, Bid-Beating International Payscraper®! Even where four-wheel prime mover units bogged down and slowed this Rio Grande Floodway Project to a standstill, two new, easy-loading, high-clearance 75 Payscrapers—push-loaded by a TD-24 Torque Converter crawler—were able to complete a critical job on schedule. Compare a payload-boosting new Payscraper to any other two-or four-wheel unit in any operating condition.

Try it..

bonus-powered crawlers . . . matched dozers. This new 103 hp TD-18 (182 Series) is helping build streets in a Saginaw Michigan subdivision—dozing sand with International hydraulic dozer. Operator rides in adjustable, "club-car" comfort—has "control tower" job-bossing vision, and a clean, safe deck with ample "stretch-out" room.



Try it..

a brawny new rock-rugged International Payhauler® . . . for *fast off-highway* hauling. Haul rock or aggregate, ballast, or ore, off-highway—operate at speeds up to 38 mph—try a new 18-ton Model 65, or 24-ton Model 95, International Payhauler. Turbo-charged, diesel-powered with highest hp-to-ton capacity ratio on the market! Strongest main frame sections known. See and try an International Payhauler!

Try new International® *performance on your job!*

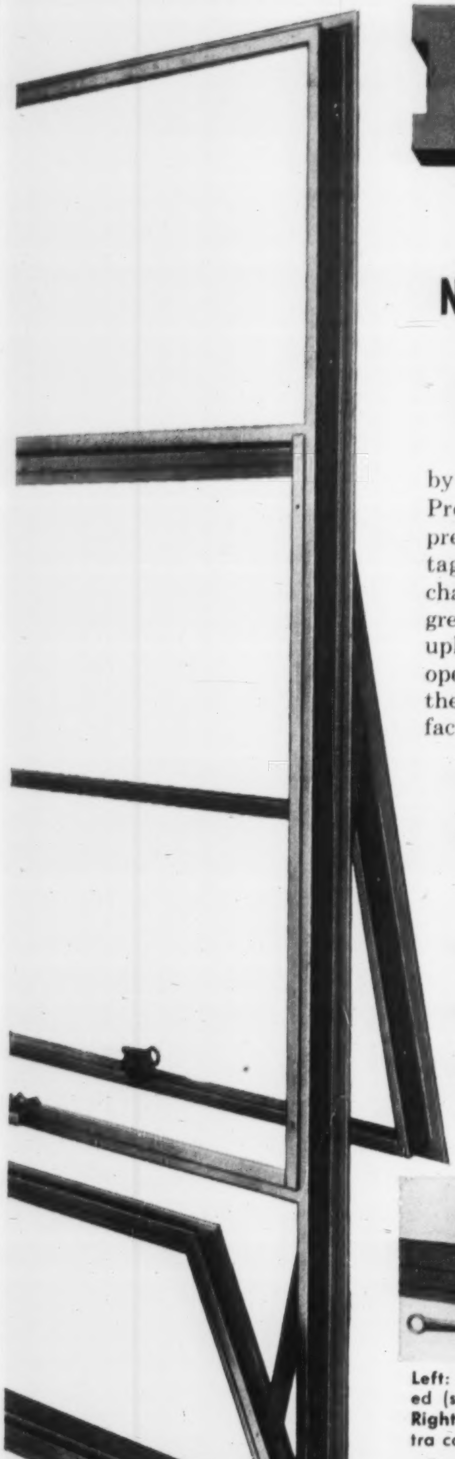
See you at the
ROAD SHOW
CHICAGO
Jan. 28 - Feb. 2, 1957

INTERNATIONAL
HARVESTER

INTERNATIONAL®
Construction Equipment

International Harvester Company, 180 N. Michigan Avenue, Chicago 1, Illinois

A COMPLETE POWER PACKAGE INCLUDING: Crawler, Wheel, and Pipe-Boom Tractors . . . Self-Propelled Scrapers and Bottom Dumps . . . Crawler and Rubber-Tired Loaders . . . Off-Highway Trucks . . . Diesel and Carbureted Engines . . . Motor Trucks

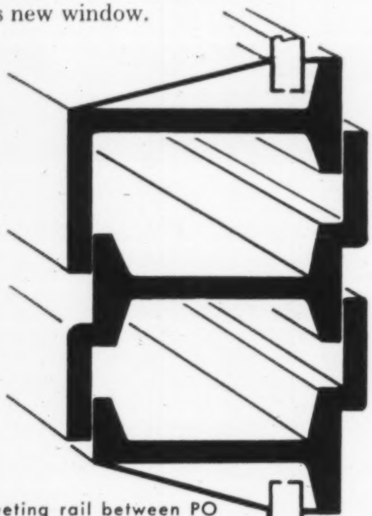


Bayley

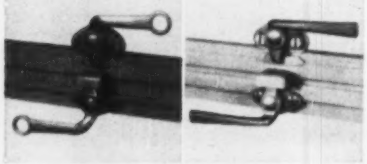
introduces a NEW STANDARD of construction in a STEEL HEAVY INTERMEDIATE PROJECTED WINDOW

Featuring new one-piece solid hot-rolled sections assembled by machine welding, this new Bayley Steel Heavy Intermediate Projected Window now offers you a window that exceeds all present industry standards. It retains the time-proven advantages of Bayley section design *plus* new shape and weight characteristics, hardware and fabrication details that result in greater strength, better weathering and maximum freedom from upkeep — an extraordinary dollar value in window service and operating qualities. The features listed below readily reflect the Bayley window engineering experience and modern manufacturing methods embraced in this new window.

- 3.5 lbs. per foot weight of ventilator frame and jamb
- Sections (one-piece) 1½", 1⅝" and 1¾" deep — with wide parallel double-contact weathering rolled integrally
- Joinery — machine welded and finished
- Outside glazed — accommodates ½" insulated glass
- Wide triple-contact brass friction shoes assure smooth operation of ventilators



Meeting rail between PO and PI Ventilators FULL SIZE



Left: Steel handle fastener, lacquered (standard)
Right: Bronze handle fastener (at extra cost)

Meets STEEL WINDOW INSTITUTE'S Specifications

Send Today for complete specifications — or consult your local Bayley Representative. Also see Bayley in Sweets — 17a/Ba.

THE WILLIAM BAYLEY CO.

Springfield, Ohio

***District Sales Offices:* Springfield • Chicago • New York • Washington**

Publications

Recessed lighting–Data on a wide range of both shallow and deep, recessed incandescent lighting units are given in a 20-page, two-color bulletin. Cross-section drawings, specifications, candlepower-distribution curves, and coefficients of utilization are presented for lighting units, which include models with face frames of cast aluminum, stainless steel and die-formed steel. Also covered are special weatherproof fixtures for outdoor use. Units described include square and round fixtures for 100, 150, 200 and 300-watt lamps with prismatic and metal reflectors and with flat and curved Holophane Controlens diffusers. Square units described are 6½, 8½ and 12-in.; round units range to 13½ in. in diameter. GRUBER LIGHTING, 125 SO. FIRST ST., BROOKLYN 11, N. Y.

Heavy-truck engines–In connection with its newly announced line of International heavy-duty V-8 powered trucks, the International Harvester Co. now offers a 16-page booklet in which design and engineering features of the new V-8 engines are explained. CONSUMER RELATIONS DEPT., INTERNATIONAL HARVESTER CO., 180 N. MICHIGAN AVE., CHICAGO, ILL.

Payscraper–International Harvester's new Model 75 Payscraper is described in an eight-page mailing folder. With a capacity of 20 cu yd without sideboards, the model 75 features a straight-back bowl, has a rated top speed of 24 mph. CONSUMER RELATIONS DEPT., INTERNATIONAL HARVESTER CO., 180 NORTH MICHIGAN AVE., CHICAGO, 1.

Glass-coated smokestack–Advantages of glass-coated steel smokestacks are corrosion-free surfaces inside and out, and light weight compared with conventional linings. A four-page bulletin gives the facts and specifications of this new product. A. O. SMITH CORP., PROCESS EQUIPMENT DIVISION, MILWAUKEE 1, WIS.

Trailers–A new catalog listing the complete line of trailers built by Rogers is now available. The book describes the line, and many of the features and specifications as well as uses of the product. ROGERS BROS. CORP., ALBION, PA.

Truck cranes–Three new brochures describe the full line and component parts of Quick-Way truck shovels. QUICK-WAY TRUCK SHOVEL CO., DENVER, COLO.

owner
Pennsylvania Tower
Bldg. Corp.
Philadelphia

architect
Vincent G. Kling
Philadelphia

general contractor
McCloskey & Company
Philadelphia

structural engineer
Thomas J. McCormick
Philadelphia

erector
F. E. Smith, Inc.
Philadelphia

electrical contractor
Harry F. Ortlip Co.
Philadelphia

Cut costs

— with multi-use Milcor Celluflor instead of wet-mass construction

Because it serves both as a structural element and as a means for electrification, Milcor Celluflor was specified for use in the Transportation Center now under construction on the "Chinese Wall" site of the old Broad Street Station in Philadelphia's new Penn Center Development.

Although the building was originally designed for bar-joist and reinforced-concrete construction, plans were changed when cost comparisons showed that a "blend" of Milcor Celluflor and Floor Sections would do two important jobs in one installation — and for less money. The Celluflor "blend" design was specified for 15 of the building's 18 floors.

Other costs dropped, too. The Celluflor and Floor Sections were erected on beams set 1½ inches below the girder elevations, reducing the height of the building 2½ feet — a substantial saving in building materials.

These factors also influenced the change:

a. Speed of erection. Milcor Celluflor goes up fast, provides working and storage areas for all trades, accelerates the entire job.

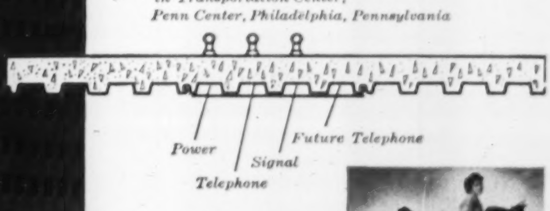
b. More electrification. The grouping of four cells on 6-ft. centers is a Celluflor exclusive not available in any standard underfloor duct system used with reinforced concrete. This means greater electrical capacity, wider latitude for changes in office layouts.

c. Low maintenance costs. Simplicity and economy of changes in electrical outlets is attractive to owners and tenants alike.

This Celluflor "blend" idea can be applied to a wide range of conditions. Call on us. Write for Catalog 270.

MILCOR® Celluflor

Cross-section of Celluflor installation in Transportation Center, Penn Center, Philadelphia, Pennsylvania



Milcor Celluflor provides variable capacities to handle any type of electrical need. Cells can be spaced on 6-inch centers to permit the installation of service outlets at virtually any point on the floor.

INLAND

INLAND STEEL PRODUCTS COMPANY
DEPT. G, 4147 W. BURNHAM ST. • MILWAUKEE 1, WIS.
BALTIMORE • BUFFALO • CHICAGO • CINCINNATI • CLEVELAND
DALLAS • DENVER • DETROIT • KANSAS CITY • LOS ANGELES
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AUTOMATIC UNDERGROUND SEWAGE LIFT STATION

using **weil**

Heavy Duty Vertical Screenless Sewage Pumps

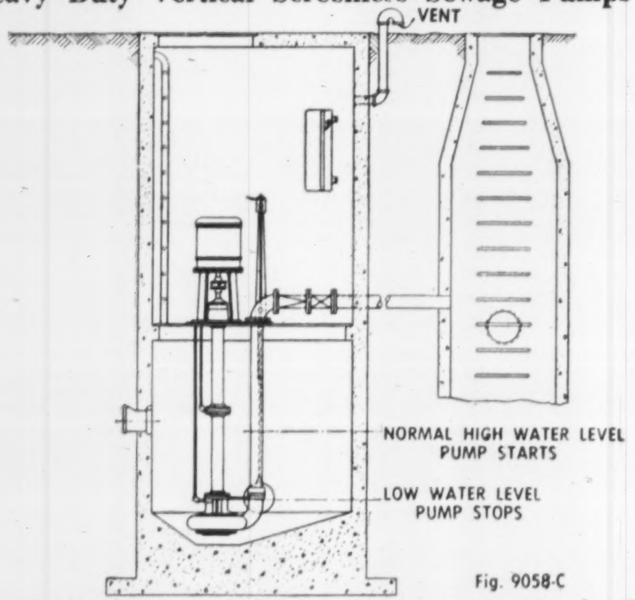


Fig. 9058-C

Automatic underground lift stations are required when sewage or waste from a group of industrial buildings or residences cannot drain by gravity into the main trunk sewer or treatment plant. An economical installation is this submerged style ejector operating in a wet pit. The motor and electrical controls are mounted above the pump cover. Either single or duplex pumps may be used. Provision for increased loads can be made by installing a single pump in a pit of sufficient capacity to allow addition of a second pump at a later period. Pumps can be supplied with totally enclosed or explosion proof motors and moisture proof or explosion proof control where conditions require.

The Weil Heavy Duty Vertical Sewage Pump is supplied with the special non-clog impeller (Fig. C-9001). This impeller is the most important part of this screenless non-clog sewage pump. The complete unit supplies the ideal method of pumping sewage or other unscreened liquids containing solids because the efficiency of this type of unit is measured by its ability to pump waste without trouble from clogging.

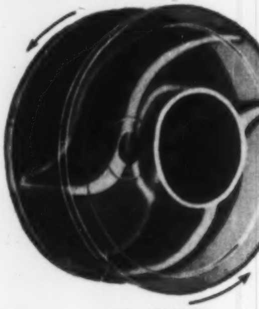


Fig. C-9001

Send for Bulletin C-900. Special engineering data and requirements for underground lift stations will be supplied upon request.

weil PUMP COMPANY

1528 No. Fremont St.   Chicago 22, Illinois

International

River Development

Philippine hydro scheme pulls builders, backers

The Philippine government has been negotiating with three foreign firms for the financing and construction of the Marikina multipurpose river development project near Manila. It is a project expected to cost around $65 million.

Foreign firms that have made separate proposals and negotiations with the government through the government-owned National Power Corporation, are:

- Texas Construction Corp. of Dallas, Tex.
- Kumagaigumi Company, Ltd., of Japan.
- Amibu Corporation, a French firm.

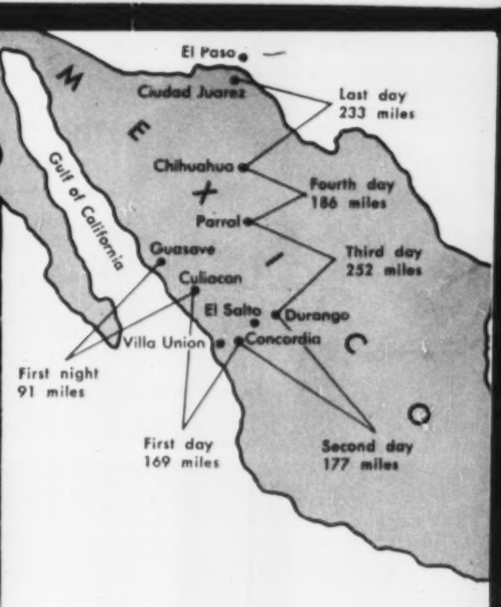
Construction of the Marikina project was authorized by the Congress of the Philippines last year. According to the National Power Corporation, the project could provide water for irrigation of about 6,000 hectares of land in the Marikina valley as well as for the industrial and household requirements of Manila; and it would provide for flood control and generation of electric power. There would be an installed capacity of 60,000 kw with provisions for another 30,000 kw.

The offer of Clint Murchison, president of the Texas Construction Corp., includes financing and construction of the Marikina project.

The Japanese construction firm, Kumagaigumi Company, Ltd., has offered to finance privately the construction of the project and to be reimbursed later from the Japanese reparation payments to the Philippines. Filipino contractors would participate with an all-Filipino labor force numbering some 2,000 at the peak of the construction. Equipment and construction materials would be brought from Japan except for materials locally available.

The Manila representative of the French firm, Amibu Comporation, had not presented a detailed proposal but the general outline of the firm's proposal calls for a joint venture with a Filipino firm in the construction and financing of the project.

Domingo V. Poblete, President of the Federation of Asian and Western Pacific Contractors Association, has disclosed that he has conferred with officials of the National Power Cor-



Rubber-tired, self-powered scrapers drive 1,100 miles between jobs

When Ing. Jose Plata contracted to handle an earthmoving job in Ciudad Juarez, Mexico, the two Model D Tournapull-Scrapers he needed for the work were 1,100 miles away, in Guasave, Sinaloa, Mexico, on the eastern coast of the Gulf of California.

To save money on freight costs, Señor Plata decided to drive the two machines overland to the new work site in Ciudad Juarez, just south of the Mexican-U.S. border at El Paso.

The trip, some of it over unfinished roads and across the western extension of the Sierra Madre Mountains, took just over 5 days. According to Señor Plata, the D Tournapulls averaged 26.7 miles per hour during the time they were traveling.

Cross Sierra Madre Mountains

The first part of the trip from Guasave to Villa Union is over a good blacktop road in flat coastal country. From Villa Union to El Salto, the road leads across the western branch of the Sierra Madre Mountains. Curves are very sharp. Grades are steep, ranging up to 12% in many places.

Starting late the first night, the two machines drove 91 miles from Guasave, to Culiacan. After resting, operators continued another 169 miles, from Culiacan, through Villa Union, and stopped for the night in the inland city of Concordia.

Parts of the road between Concordia and El Salto, a distance of more than 124 miles, were also under construction when Tournapulls drove through. The emergency roadway, partly graveled, measured about 16 feet wide. All trucks using this road had to travel at very slow speeds and with the utmost care.

But, thanks to instant-responding electric controls, big four-wheel air-brakes, and giant low-pressure tires, these big Tournapull-Scrapers were able to maneuver safely over this dangerous mountain road. Machines left Concordia on the second day, crossed over the mountains on a temporary road, and then traveled 53 miles over a good asphalt road to reach the city of Durango. Total mileage for the day: more than 177 miles.

Travel 252 miles in 1 day

The rest of the road to the border is asphalt-paved, and most of it is built across flat country. Here machines could travel much faster!

On the third day, machines drove 252 miles, Durango to Parral. The next day, they reached the city of Chihuahua 186 miles away. The last day, machines covered the final 233 miles between Chihuahua and work site in Ciudad Juarez.

Better mileage than trucks

Señor Plata was delighted with the ability of his Tournapulls to travel from one job to another under their own power. He adds that *Tournapull mileage was far better than that of trucks traveling over the same road.*

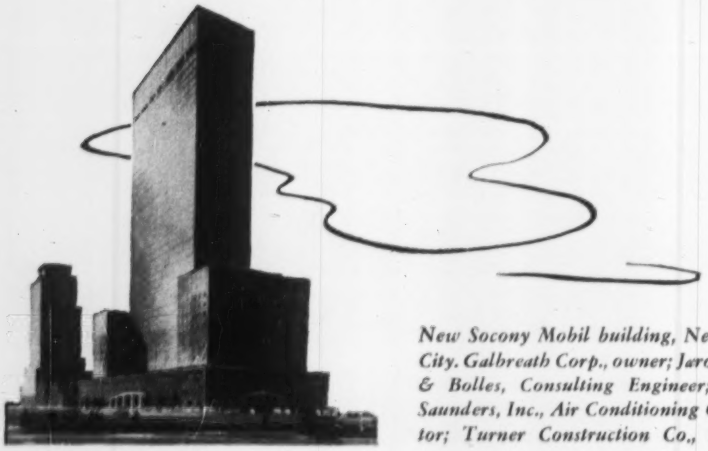
You may never have to drive your earthmoving equipment 1,100 miles across mountains and plains. However, Tournapull's work-and-run ability cuts non-productive time to a minimum on *any* distant move. With 29.5 mph Tournapulls, you take the shortest route between jobs, over highways, and through cities, to make the most economical use of manpower and equipment. If you would like additional information on how D Tournapulls can boost your profits, at work site or on job-to-job moves, call or write us for owner-verified job reports, and specifications.

Tournapull—Trademark Reg. U.S. Pat. Off. DP-1002-H-b

LeTourneau-WESTINGHOUSE Company

Peoria, Illinois

A Subsidiary of Westinghouse Air Brake Company

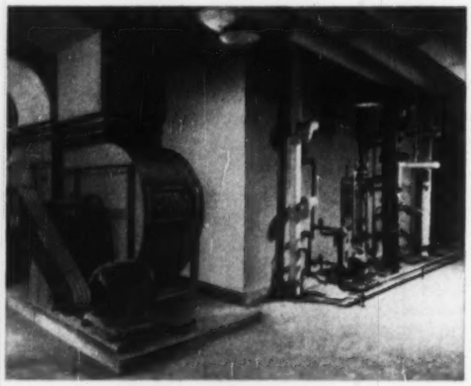


New Socony Mobil building, New York City. Galbreath Corp., owner; Jaros, Baum & Bolles, Consulting Engineer; Kerby Saunders, Inc., Air Conditioning Contractor; Turner Construction Co., Builder.

WORLD'S LARGEST AIR CONDITIONED COMMERCIAL OFFICE BUILDING USES 75 FANS, 22 CONDITIONING UNITS BY "BUFFALO"

A new landmark at Lexington and 42nd St., New York, the Socony Mobil building is a model for office buildings of the future. It is the largest fully air conditioned commercial office building in the world — the largest built in New York in a quarter-century. Offering so much to tenants, it is little wonder that its 1,300,000 square feet were virtually 100% rented before completion.

Selection of "Buffalo" for all the fans and many of the conditioning units reflects the confidence which engineers, owners and contractors have placed in "Buffalo" for the past 79 years. You will find "Buffalo" air handling equipment in outstanding plants, hotels, institutions, stores and public buildings throughout this hemisphere. And everywhere, you will find it performing to satisfaction, because "Buffalo" builds the "Q" Factor* of Quality into every unit. If you have a job for air, write "Buffalo" into the plans to insure the results you want.



"Buffalo" Type BL Fans handle air in Socony Mobil building. These fans (some of them 13 feet high) plus "Buffalo" Axial Flow Fans and "Buffalo" Shortboy Ventilation Units move all the air. PCLW Dehumidifiers, Humidifiers and PC Air Conditioning Cabinets process the air for various zones.

**The "Q" Factor — the built-in Quality which provides trouble-free satisfaction and long life.*

Buffalo

BUFFALO FORGE COMPANY
BUFFALO, N. Y.

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

VENTILATING AIR CLEANING AIR TEMPERING INDUCED DRAFT EXHAUSTING FORCED DRAFT COOLING HEATING PRESSURE BLOWING

poration on the possibility of a joint venture on the project with foreign construction firms who are members of the federation. The federation was formed recently, composed of contractors associations from Australia, China, Indonesia, Korea, Japan, Philippines, Vietnam, Pakistan, Singapore.

World Bank Gives More Aid To Colombian Road Program

The World Bank has granted Colombia a $16.5-million loan to complete a $47.3-million program to rehabilitate 1,900 miles of principal highways.

The road program was started in 1951 but has been revised and expanded to keep pace with the rapid growth of traffic. Under the original plan, work was concentrated on providing passable gravel roads, and only the more heavily traveled sections were paved. But between 1952 and 1955 the volume of traffic doubled over most of the improved roads and more than tripled near large cities. This traffic boost proved that gravel roads could not even meet current needs, so in 1953 Colombia decided to increase the proportion of paved sections to 85%.

The loan—the third made by the bank toward the program—will finance costs of equipment, materials and services needed for the increased construction work required by the new standards. In addition, bank-financed equipment will be used to build a new 40-mi road between Cienaga and Barranquilla on the Caribbean coast. This route will connect with the Atlantic (Magdalena Valley) Railroad, which is being built with assistance of other World Bank loans.

Big London Sewage Plant To Be Started in 1957

London County, Great Britain, will begin work early in 1957 on a $27.4-million sewage plant on the site of the existing southern works at Erith in Kent. When completed about seven years hence, the new plant will handle sewage from a 71-sq-mi area lying south of the Thames River and containing 1,600,000 persons. The existing plant will be modified to handle flows during storms.

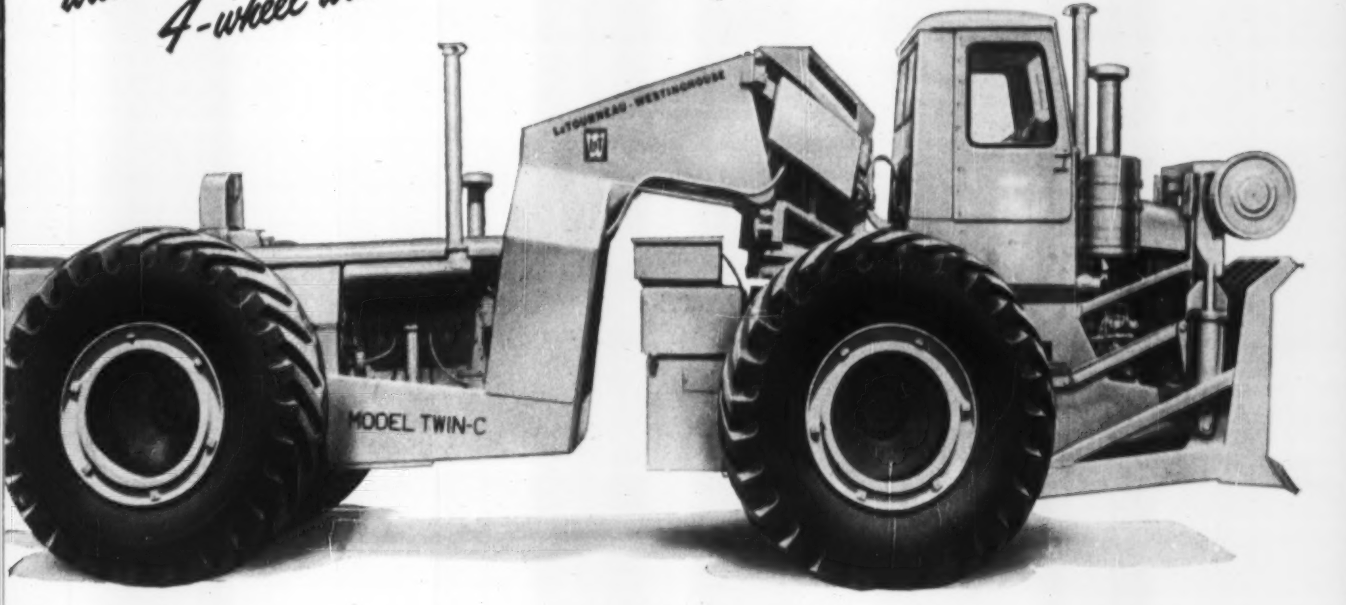
An activated sludge plant permitting step aeration and re-aeration has been designed utilizing upflow mechanical aerators. Treatment steps include mechanical screening, degritting channels, primary sedimentation, aeration and final sedimentation.

Sludge facilities will consist of 16

Now... world's MOST POWERFUL and FASTEST push tractor...

with 416 HP and 4-wheel drive

The Twin-C Pusher



...to give you bigger loads in shorter loading time

One operator and this powerful "Twin-C" pushes your biggest production scrapers for capacity yardage. On many jobs it will do this in less time than it takes 2 crawler-pushers with 2 operators. Rubber-tired speed, and articulated steer, give quick maneuverability for direct-line push, save seconds in picking up next load.

Synchronized power matches speeds of earthmovers — Twin-C speeds match loading speeds of modern rubber-tired earthmovers, take advantage of combined power of loader and pusher to get big pay loads *fast*. Torque converter, teamed with constant-mesh transmission in both front and rear engines, reduce "lug downs" and gear changes necessary in many pushers.

More usable power with rubber pushing rubber — You get greater usable horsepower and coordinated pushing force when you push rubber with rubber. You get full floating traction... tire treads follow tire treads... no loss of power to flatten out rounded tire-tracks into flat track-tracks. And Twin-C's 80,000 lbs. weight rides on four big 29.5 x 29 tires with 22-ply rating; each 2′5″ wide for firm ground-gripping traction on any type of surface.

Additional Twin-C advantages:

- Forward speeds to 20 mph and fast reverse, plus "articulated" steer, enable Twin C to position faster behind scrapers.
- Big 49½ x 88″ heavy, concave push-bowl is positioned by an electric motor to take full advantage of contact area provided by scraper push-block.
- Push-button electric controls with instant response, the same type controls used on LeTourneau-Westinghouse scrapers for 8 years, give you positive power-steer and accurate push-plate-positioning.
- Power-transfer differentials on both engines match pull to traction, automatically apply power to wheels on firmest footing. Keep big pay-loads rolling in sand, mud, and loose materials.

If your fleet includes production scrapers, you will want more information on the Twin-C Pusher. Ask your LeTourneau-Westinghouse Distributor for full details.

65,900 lbs. Drawbar Pull! Powerful 416 hp Twin-C Pusher push-loads scraper fast. In recent Dynamometer tests, Twin-C, operating in sandy clay footing, registered drawbar pull of 65,900 lbs. in low-speed range.

Twin-C—Trademark TW-1039-G-b

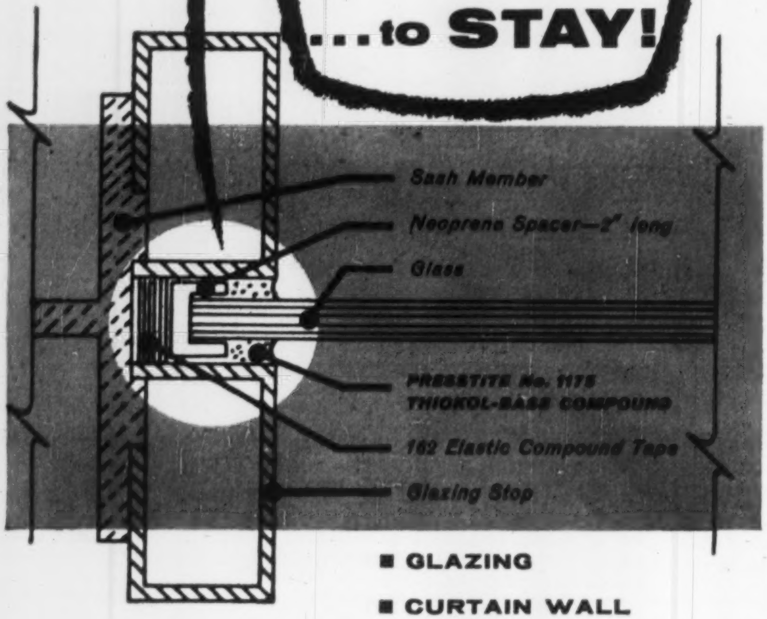
LeTourneau-WESTINGHOUSE Company

Peoria, Illinois

A Subsidiary of Westinghouse Air Brake Company

PRESSTITE
THIOKOL-BASE
Sealing Compounds

are HERE
...to STAY!



- GLAZING
- CURTAIN WALL PANELING
- MASONRY EXPANSION JOINTS

This typical application-design illustrates the use of Presstite No. 1175 . . . a sealant that owes its many desirable characteristics to its Thiokol base: intimate adhesion . . . year after year durability against water, air and dust (including conditions of torrential and gale intensity) . . . resiliency to withstand the severe stresses found in large expanses of glass and metal.

APPLICATION DESIGNS *specifically tailored to suit your particular jobs will be gladly offered by Presstite engineers. Working samples, specifications and literature are available on request.*

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SEALING COMPOUNDS
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ENGINEERING PRODUCTS
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A Division of AMERICAN-MARIETTA COMPANY
3784 CHOUTEAU AVENUE, ST. LOUIS 10, MISSOURI • 101 EAST ONTARIO STREET, CHICAGO 11, ILLINOIS

80-ft-dia primary tanks, each equipped with floating roof and self-contained heating and circulating units, and 8 120-ft-dia secondary digestors. An estimated 1.25 mcf of gas will be produced daily.

Digested sludge will be disposed of at sea, but an anticipated 10,000 tons per year of grit will help reclaim some nearby low-lying marshland. J. Rawlinson is chief engineer of the London County Council and will direct the program.

New 2½-Mile Ganges Bridge Will Open Up North Bihar

India has started construction of a $28-million bridge that will stretch 2½ miles across the Ganges River in Bihar.

The new span—first planned nearly 50 years ago—will carry highway traffic on the upper deck and a broad gauge rail track on the lower deck. It will be the only span over the Ganges along a 500-mi stretch east of Benares.

When completed in 1959 the bridge will link north and south Bihar by road and rail for the first time, opening to direct land communications an area twice the size of Belgium with a population of 18,000,000. Until now, northern Bihar has been accessible only by a roundabout land route or by boat across the Ganges.

Koyna Dam in Bombay State Split Up Into Three Stages

Work on the $69.3-million Koyna Dam in Bombay State is under way after two years of preliminary surveying, according to the Indo-German construction combine of Shah-Salzgitter-Jolly.

The Koyna project will be completed in three stages. By 1960—engineers hope it will be by the end of 1958—the underwater works are expected to be finished: headrace tunnel, surge shaft and tailrace tunnel. By the middle of the second stage, it is proposed to complete the powerhouse, which, when ready, will generate 500,000 kw. When the 270-ft high dam is finally completed, it will help irrigate 400,000 acres.

A director of the Shah Construction Co. told McGraw-Hill World News that negotiations are going on with four West German firms for the purchase of $26 million worth of earthmoving and other machinery including generators for the power plants.

Sweden also is providing an expert team of drill masters together with equipment.

Loose, shifting sand
licked with rubber-tired power

To relocate a Seaboard Air Line Railroad siding at Storey, Florida, Cone Bros. Contracting Company, Tampa, moved 160,000 yards of very loose, dry, shifting sand with one Tournatractor-and-scraper, 4 Super C Tournapulls, and 8 crawler-tractors. In the first 10 working days, the fleet moved 48,000 yards of the total amount of sand involved in the assignment.

On this new 5300' rail-bed which serves General Portland Cement Company, Cone Bros.' fast Tournatractor was the outstanding dirtmoving rig. It distinguished itself especially by its ability in sand operation.

Tournatractor . . . hard-working rig

Pusher-loaded by a crawler-tractor, the Tournatractor-scraper combination made fast work of loading sand out of the right-of-way . . . then traveled with a heaped load through loose, dry sand in the cut to a short exit-ramp. From the sandy cut, Tournatractor and scraper made a "U" turn onto haul road with very little tire penetration into the sand. Units then spread on the waste dump. Since sand was not compacted, dump was loose and deep, but big rubber tires on Tournatractor provided good flotation.

Powerful Power Control Unit

Working with the scraper, Tournatractor proved a valuable pulling unit. A pair of powerful electric motors actuate Tournatractor's fast-acting, true-spooling rear power control unit. Safe, sure brakes on electric motors automatically stop unit the instant dashboard-switch is released. This power control unit works with any type of cable-control scraper which can be hitched to Tournatractor drawbar.

Combines speed and economy

Power from Tournatractor's big 208 hp diesel moves from transmission on high-speed, anti-friction bearings to drive wheels. With all-gear drive, you have no chain or tracks to stretch, snag, or wear. Maintenance is lower than that of crawlers, since 4 rubber-tired wheel units with anti-friction bearings do the work of some 500 high friction track parts.

"Pleased with Tournatractors"

Vice President J. L. Cone, Jr., of Cone Bros. agrees with contractors all over the world who have found that Tournatractor's quick, on-the-job mobility . . . its fast push and pull ability . . . are valuable cost-saving advantages. He says, "Our Tournatractor is extremely versatile. Working with a scraper, its power means lower cost production. The root rake and the bulldozer mean higher profits for us, too. We are very pleased with the performance of our Tournatractor."

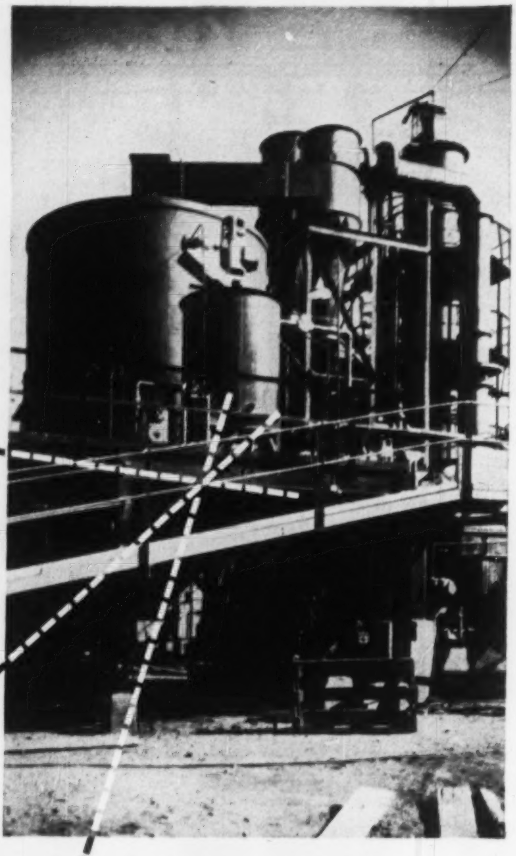
Investigate Tournatractor's profit advantages

Tournatractor's ability to move rapidly around a job under its own power is a big cost-cutting advantage. The handy machine quickly fills in on cleanup, dozing, towing, and pushing assignments . . . in addition to pulling duties like those described here. Tournatractor combines smooth, efficient, simple operation, and economy of maintenance, with fast 17 mph speeds that enable it to handle a wide variety of scattered assignments in a hurry. It cuts cost, makes profit for you!

Tournapull, Tournatractor—Trademark Reg. U.S. Pat. Off. T-921-RR-b

LeT

LeTourneau-WESTINGHOUSE Company
Peoria, Illinois
A Subsidiary of Westinghouse Air Brake Company



IN SOUTH AFRICA

AROUND THE CLOCK

A TANK CAR AN HOUR OF H_2SO_4

This FluoSolids System at West Rand Consolidated Gold Mines, Ltd. on South Africa's fabulous Witwatersrand was started up early in 1952. The first of several to go into operation on the Rand, it was also the first in the world to combine FluoSolids roasting of pyrite with a contact acid plant.

Over 1650 tons of H_2SO_4 — enough to fill twenty-four tank cars — are being produced every day for uranium leaching at seven South African mills.

An important part of each of these installations is a Dorrco FluoSolids System. Cumulatively the Systems include nineteen Reactors, of which sixteen were on original order and three on repeat orders, plus additional Dorr-Oliver and auxiliary equipment to produce a high strength SO_2 gas for acid manufacture by conventional contact acid plants.

Total feed to the Systems is 1450 tons per day of pyritic gold mill tailings — averaging 35 to 45% total sulfur, gas production is 75,000 to 82,000 SCFM. Gas strength averages 12 to 13% SO_2 . . . sulfur recovery approximately 90%.

The efficiency and economics of the Dorrco FluoSolids System is in evidence in these facts. Additional representative proof that the FluoSolids process can produce an SO_2 gas at lower investment and operating costs than other roasters.

If there's a step in your flowsheet where intimate contact between solids and gases is essential, fluidization should be investigated. Just drop a line to Dorr-Oliver Incorporated, Stamford, Connecticut.

FluoSolids is a Trade Mark of Dorr-Oliver Incorporated, Reg. U. S. Pat. Off.

DORR-OLIVER
INCORPORATED
WORLD-WIDE RESEARCH • ENGINEERING • EQUIPMENT
STAMFORD • CONNECTICUT • U. S. A.

Men and Jobs

Maj. Gen. C. H. Chorpening Retires From Engineer Corps

Maj. Gen. Claude H. Chorpening, who was Assistant Chief of Engineers for Civil Works from 1951 to 1954, retired from the Army's Corps of Engineers June 30 after more than 40 years of service.

As assistant chief for civil works, he was in charge of all flood control and rivers and harbors projects. This duty followed three years service as assistant chief of personnel and administration. Earlier, he was district engineer at Tulsa, Okla.

During World War II General Chorpening served in both the European and Pacific theaters of operation. His most recent assignment was to the U.S. Armed Forces, Far East, where he served as assistant chief of staff, G-4, at the headquarters in Zama, Japan.

General Chorpening is a 1918 graduate of the U.S. Military Academy. Among his assignments prior to World War II was a five-year tour at Fort Peck, Mont., during building there of the world's largest hydraulic earthfill dam.

Name New Chief Engineer For N.Y. Works Bureau

Thomas F. FitzGerald of Troy has been named to the $17,000-a-year post of Chief Engineer of the New York State Department of Public Works.

FitzGerald, a mechanical engineer with long experience in municipal and state work, replaces Eugene F. Gibsons, who has resigned to enter private employment. A native of Troy, FitzGerald is a graduate (1921) of Rensselaer Polytechnic Institute; taught at the school for 17 years, and in 1938 became Commissioner of Public Works of Troy. Since 1943, he has served as a member of the state defense council, in charge of highway repair; an engineering consultant with the War Manpower Commission; and lately as assistant manager of the Veterans Administration office in Albany.

Men and Jobs Briefs . . .

- **Associations**–The Akron (Ohio) District Society of Professional Engineers elects **S. T. Swigart** as president.

- **Corps of Engineers**–**Lieut. Col. Donald B. Williams,** recently attached to the Corps depot at Yokohama, Japan, is assigned as assistant to **Col. Loren W. Olmstead,** district engineer

Tournapull Rear-Dump load falls clean and fast over the bank. At full dump position, bowl-lip is behind rear wheels, preventing material from rolling under the machine. "C" turns 180° non-stop in 28'8"; "D" needs 24'8".

Maneuverability speeds construction of Brazilian power plant

16 TOURNAPULL REAR-DUMPS move 66% of dirt in 18 months; 16 trucks take 3 years to haul 44%

Earthmoving contractors throughout the world are taking advantage of the work-capacity, speed, and ruggedness offered by Tournapull Rear-Dumps. Here's how one dirtmover in South America speeds construction of a gaint power-plant and dam, with these maneuverable, easy-operating haulers.

To meet growing power loads in the Brazilian states of Sao Paulo and Minas Gerais, Companhia Paulista de Forca e Luz, a subsidiary of American and Foreign Power Company, is building a huge hydro-electric plant. The plant will have an ultimate capacity of 400,000 kilowatts. Design and construction of plant and dam is being handled by Ebasco Services Incorporated.

About 2,280,000 cu. yds. of sandstone and quartz, and 450,000 cu. yds. of earth mixed with loose pebbles must be moved in building the dam across the Rio Grande River.

First, to allow for dam construction, a tunnel 200 yds. long, and 52 ft. square had to be cut through solid rock, to divert the narrow, deep, swift-running river. Next, haul roads had to be cut into cliffs that tower as high as 2,500 ft. on both sides of the river. Finally, tons of aggregate had to be hauled in from a quarry a mile away, for use in the dam itself.

Outwork dump trucks, cut costs

With four 11-ton D and twelve 22-ton C Tournapull Rear-Dumps working on the project, the fleet moved more than 46% of the material in 12 months. This in spite of heavier-than-usual rains, totaling 7½ inches, during some months. With their powerful four-wheel air brakes, Tournapulls were able to travel safely over the most dangerous hillside roads.

When this report was taken, after three years of work, 16 ordinary dump trucks had moved only 111,000 cu. yds. of earth, and 85,000 cu. yds. of rock — out of a total of 450,000 cu. yds. of earth and 1,500,000 cu. yds. of rock. Tournapull Rear-Dumps handled all the rest!

On typical 1300-ft. cycles, each C Tournapull delivered a 9-yard load of gravel and earth every 9.8 minutes. According to time studies taken during one 9-hour day, each of 4 C Rear-Dumps hauled 63 loads of stone 1 mile from quarry to crusher.

Good maintenance record

Management finds that lubrication time of Tournapull Rear-Dumps is much less than that needed for dump trucks. "Servicing takes only a few minutes, as there are only 6 to 8 grease-points," says Master Mechanic R. G. "Bob" Shaugniss. "We use Rear-Dumps hard, and they continue to give excellent service."

You, too, can profit from the many advantages offered by modern LeTourneau-Westinghouse equipment. Ask us to give you facts and figures on the size Tournapull Rear-Dump you need — 11, 22, or 35 tons.

Tournapull—Trademark Reg. U.S. Pat. Off. RDR-967-D-b

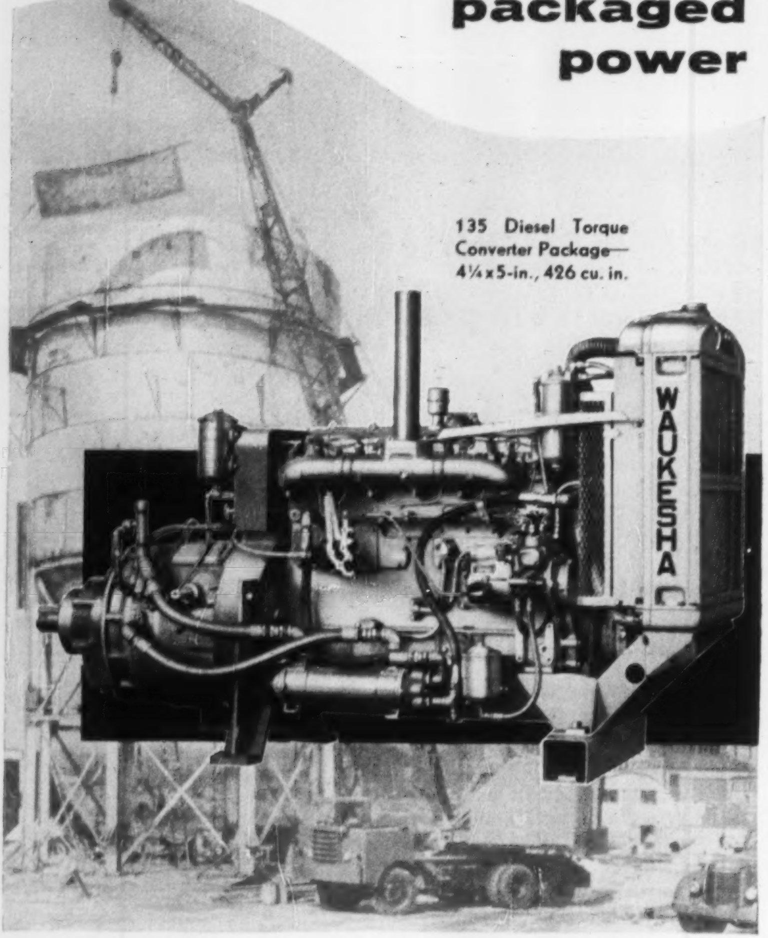
LeTourneau-WESTINGHOUSE Company

Peoria, Illinois

A Subsidiary of Westinghouse Air Brake Company

WAUKESHA

engine torque converter packaged power



Diesel • Gas • Gasoline—20 hp to 1100 hp

for torque converter application in shovels, cranes and hoists; trucks and tractors—the result of Waukesha's 15-year development program in this field. Torque converters eliminate shock to driving and driven mechanism; prolong life of equipment; boost output work 10 to 40%. Power, automatically matched to the load, is delivered smoothly without stalling.

WAUKESHA MOTOR COMPANY, WAUKESHA, WISCONSIN
NEW YORK • TULSA • LOS ANGELES

50th ANNIVERSARY Waukesha 1906-1956

317

A. J. Paddock

American Bridge's New Head

U. S. Steel Corporation has announced the appointment of Austin J. Paddock as president of its American Bridge Division.

Paddock has been a vice-president in the division since 1946, first as head of manufacturing operations and later in charge of contracting. He succeeds Norman B. Obbard, who will go with U. S. Steel as an assistant executive vice-president in operations.

Paddock began his career with American Bridge in 1929, following graduation as a civil engineer from the University of Michigan. His first job was as timekeeper in the erecting department. After a year he moved to the drafting department, where he worked up to plant rate clerk and industrial engineer. In 1934 he was appointed assistant to the manager of the Elmira, N. Y., plant, and in 1937 advanced to manager. In 1941 he was transferred to the Gary, Ind., plant, where he served as manager for five years.

at Buffalo, N.Y. He replaces **Lieut. Col. James H. Holcombe,** who is transferred to the Alaska Command at Anchorage.

• **Careers**—Sanitary Engineer Director, **Kaarlo Nasi** who was assistant chief, Water Supply and Pollution Control Branch, Public Health Service, Department of Health, Education, and Welfare, is transferred to the Federal Civil Defense Administration at Battle Creek, Mich., as chief of the Emergency Sanitation Division . . . **Clarence G. Watters, Jr.** will become chief engineer of the Helfix Irrigation District, east of San Diego, Calif. (formerly called the Le Mesa, Lemon Grove & Spring Valley Irrigation District) on July 1. He succeeds **M. J. Shelton,** who has resigned effective that date to accept appointment as

Pushed by a crawler-tractor in a very soft borrow pit, "C" loads 12 pay yards of mixed silt, sand, and clay, in an average of 90 seconds.

Exclusive differential permits haul through *soft footing*

where other earthmovers bogged down

Rubber-tired scrapers build experimental dike to test soil settlement

Although nearby land desperately needs irrigation, thousands of tons of water from the Ogden and Weaver Rivers in Utah flow into the Great Salt Lake — and are wasted — every year.

In order to make use of this water, the U.S. Bureau of Reclamation plans to build a 12-million-yard dike, 12 miles long and 35 feet high. After the dike is completed, about 216,000-acre feet of water will be impounded behind it, in the Willard Bay Reservoir.

To test soil settlement for this dike, the Reclamation Bureau awarded a contract to Young & Smith Construction Co., Salt Lake City, to build a test dam embankment at Willard, 17 miles north of Ogden, Utah. This rectangular test section covers 454,000 sq. ft.... is 797′ by 570′... needed 174,000 yards of sand and silt mixture.

"C's" work in soft mud

One of the first and biggest problems on this job was the soft, spongy mixture of silt and sand that had to be hauled from the borrow pits. Although the footing looked firm, the water table was extremely high. To make material even softer, rain fell frequently during the time work was in progress.

> *NEW improved 18-yard heaped capacity Fullpak "C" will give you faster, bigger loads than shown in this job report. New lower, wider bowl packs in load to back corners with live, boiling action, heaps quickly for big, low-void pay-load. Get details.*

At first, Young & Smith tried 20-yard, self-powered scrapers of another make, but these machines were much too heavy to work in the loose footing. First day on the job, one of these units sank into soft material over its tires, with only the top of its engine, cab, and sideboards above ground.

Contractor then decided to bring in his two C Tournapulls which carry less deadweight than other scrapers of similar capacity. The "C's" were able to stay on top much better in this extraordinary soft going. When the contractor saw how well these machines performed in unstable material, he secured two more "C's" from the L. A. Young Construction Co. and worked all 4 Tournapulls in unstable areas while heavier scrapers worked in firmer ground.

Says Superintendent D. H. Stringham, "Tournapulls are doing a good job here. They work much better in this soft stuff than other equipment because differential helps pull them through." Operator Jay F. Hansen adds, "We have no trouble shifting gears with the tournamatic transmission and the power-transfer differential."

1-mile cycle in 5.7 minutes

In spite of the soft footing, Tournapulls completed 1-mile cycles in about 5.7 minutes ... delivered about 9½ loads (12 yards each) per hour. Most of the time, Tournapulls were able to haul in 4th gear at speeds up to 19 mph... averaged 14 mph on haul.

According to records, kept during 15 ten-hour days, Tournapulls averaged 38 trips per day on cycles up to two miles long. Competitive 20-yard scrapers averaged 30 to 35 trips per day on shorter hauls over firmer ground.

Since your next job may involve mud or other uncertain footing, why not find out more about Tournapulls now? Ask for owner-verified production figures on work similar to yours. Check for yourself with Tournapull owners. See Tournapulls in action on your job by asking your LeTourneau-Westinghouse Distributor for a demonstration.

C Tournapull spreads 12 yards of sand, silt and clay to build the "Willard Dike Test Section". After this section stands for a year or two, to test land settlement, contract will be let for the main dike. Four "C's" have been working 60 hours a week on this dike-building job.

Tournapull—Trademark Reg. U.S. Pat. Off. P-911-D-b

LeTourneau-WESTINGHOUSE Company

Peoria, Illinois

A Subsidiary of Westinghouse Air Brake Company

When it rains,
it sometimes pours destruction

(Based on Company File #118B6875)

We're architects — and when we locked our trim little office one evening we never expected it to look so different the next morning.

What a mess it was after that sudden thunderstorm! Broken windows. Water everywhere . . . on the floor . . . on the cabinets. Worst of all, on our drafting table.

We'd been working on a bank job, and were almost finished. Now every tracing was ruined! The cost of making new ones would have come out of our own pocket if we hadn't carried Valuable Papers Insurance. Our policy paid us back every cent it cost us to re-do the tracings.

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Northwestern Fire & Marine Insurance Company
Twin City Fire Insurance Company . . . ***Minneapolis 2, Minnesota***

director of the newly created California State Department of Water Supply (ENR June 14, p. 83). The Forests and Waters Department of Pennsylvania names **James W. Bailey,** formerly in charge of the Lackawanna River project at Olyphant, Pa., as district engineer at Stroudsburg, Pa. He succeeds **Marshall S. Goulding Jr.,** who is reassigned to head the department's design unit at Harrisburg . . . **Donald H. Stansfield** resigns as senior city planner at Dayton, Ohio, to become supervisor of planners in the planning bureau of the state of New Jersey's Department of Conservation and Economic Development.

A. B. Collins, city engineer of Yakima, Wash., for more than 20 years has resigned from the office . . . **W. Clyde Stone Jr.,** of Raleigh, N.C. is named city superintendent at Clinton, N.C., succeeding **Horace P. Cotton,** who has resigned.

• **Business**—The British Columbia Engineering Co. Ltd., a subsidiary of B.C. Electric Co., appoints **Henry W. Smith** of Vancouver, B.C. as assistant general manager of the engineering firm . . . **Raymond J. Rosenberger** of Bay Village, Ohio is named chief of the specifications division of the Central District for H. K. Ferguson Co.

• **Retirements**—**Ernest F. Dinsen,** general engineer of the Corps of Engineers at Louisville, Ky. after more than 40 years in various mechanical engineering capacities throughout the Middle West . . . **Frank R. Shaw,** Sanitary Engineer Director for the Public Health Service, U. S. Department of Health Education and Welfare, presently stationed at Amherst, Mass., after 38 years of service.

• **Honors**—The New Jersey Society of Professional Engineers gives its 1956 citizen award to **Carl W. Keuffel,** president of Keuffel & Esser Co. . . . The American Standards Association honors **Leonard G. Haeger,** Technical Director, Levitt & Sons, Inc., Levittown, Pa.; **Fred M. Hauserman,** president of The E. F. Hauserman Company, Cleveland manufacturers of metal partitions; and **H. B. Zackrison,** chief, engineering department, Corps of Engineers, as men who have done the most this year to encourage the use of modular measure in building . . . The 1956 Award of the Concrete Reinforcing Steel Institute is made in recognition of the joint activities of **N. M. Newmark** and **C. P. Siess** in the field of reinforced concrete research.

"We like its power and speed"

That's what manager E. J. Adcock of the R. B. Tyler Co., Jackson, Mississippi, says about the Adams 660 motor grader. After working the big machine for a couple of years, Adcock is especially impressed with its performance and ease of operation.

Photographs on this page were taken as Tyler's "660" bladed a median strip on East-West U.S. Hwy. 61, between Natchez and Washington, Mississippi. The company was building a second lane to complete 4.4 miles of 4-lane divided highway.

Power for profitable production grading

Manager Adcock likes Adams' ability to take a big cut and muscle thru the tougher jobs. He's looking for production—and getting it! 8 forward speeds—1.3 to 26 mph—and 4 reverse gears—1.1 to 13.7 mph—cut job-time, do every grading operation at fastest practical rate. Adcock also likes the ease with which operator maneuvers the 28,000-lb. machine, cuts smooth finish grades, and travels in traffic at 26 mph between jobs.

Clear view of his work, and double-action brakes, give Operator Frank Freeman confidence to blade at time-saving speeds.

Does difficult jobs fast

J. E. Polston, superintendent, finds Adams' work-horse ability and rugged construction keep his jobs ahead of schedule. Polston makes the most of "660's" road speed as he schedules it from one task to another, keeps his men and machines working at top capacity. On the U.S. 80 job he used the "660" to spread fill behind earthmovers, dig drainage ditches, scarify crossings and hard clay, cut high bank-slopes, level subgrade, and bring center strip to grade.

Easy handling . . . good ride . . . less maintenance

Operator Frank Freeman had always been partial to a competitive-make grader. In the jargon of the road crew, he was a "—" man . . . he thought there were no other graders *until he worked the "660"*. Now he says Adams is "the best". Frank likes the heavy-welded front-end construction with fully-enclosed leaning wheel mechanism—"that is tight and stays in adjustment." The ride is comfortable, rubber engine-mounts isolate vibration, foam-rubber pads the seat. He likes the way it handles, with mechanical hydraulic power steer, dual action brakes, and handy foot accelerator. Freeman feels that 13.7 mph reverse helps him get more work done, says the Adams "can back-up a quarter mile in the time some graders take to turn around".

You'll like Adams too!

You'll like their cost-cutting work capacity . . . 26 mph get-up-and-go . . . time-saving maneuverability—operator comfort. You'll like the range of sizes . . . 80, 104, 123, 150 hp . . . a grader for every size job. Why not telephone your LeTourneau-Westinghouse Distributor, right now, and ask for a demonstration?

AG-15-H-b

W LeT

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Peoria, Illinois

A Subsidiary of Westinghouse Air Brake Company

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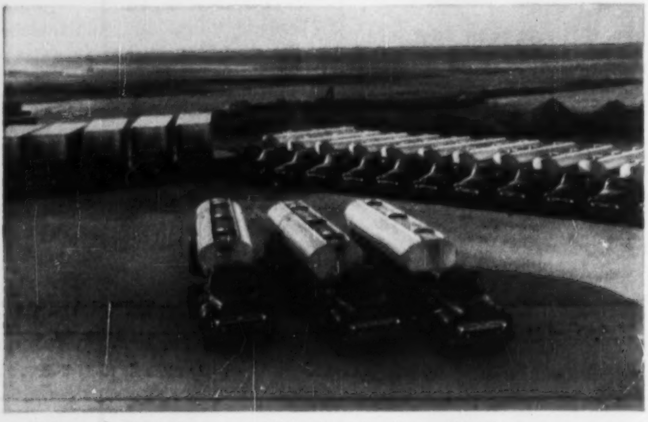
the men who
buy trucks
every
year!**

Big fleets buy more Fords



"Our 27 Fords average 5½ miles to the gallon," say cement haulers of Material Transportation Company, Harlington, Texas. "Oil economy is good, too. Our F-800 and F-900 BIG JOBS average 125,000 miles before we drop the pan. Fords are the most economical and satisfactory trucks we've ever used."

**The big fleets keep complete cost records.
They know which trucks cost less to buy and run.
And official R. L. Polk registration figures
PROVE FORD IS THE FAVORITE!**

Take a look at these pages. These leading companies are just 4 out of thousands that are finding Ford trucks cost less to buy, less to run—*and* are "tops" for all-round economy.

The "men who buy trucks every year" must take everything into consideration . . . Short Stroke engine design for low oil and gas consumption . . . Ford's stronger chassis for longer life (insurance actuaries prove Ford Trucks last longer) . . . and Ford's higher resale value. So—from Pickups to 65,000-lb. GCW BIG JOBS, the big fleets are going Ford. You'll agree *Ford Trucks cost less*—when you see your Ford Dealer.

"Our 300 Fords cost less to run," says Johnson, Drake and Piper Inc. of N. Y. City, world-wide contractor and owner of F-800 BIG JOBS. "We've tried all makes but our records show that, when all factors are considered, *Ford Trucks cost less*. Low running costs. Low purchase price. High trade-in value."

than any other make!

"Our 102 Fords last longer," says David L. Brown, Tennessee contractor and owner of Ford T-800 BIG JOBS. "In our kind of work, we need a truck that can take a real beating and keep on going. We have a Ford that's been running for 5½ years without a motor job—and it's still rarin' to go!"

ELMER C. BREUER CO.
ELMER C. BREUER CO.

"Our 30 Fords are easiest handling," says Elmer C. Breuer, Cleveland steel hauler. "Maneuvering our Ford F-900's in tight spots is timesaving and easy. And with that Power Steering our drivers finish fresh after a tough day's work. We're staying with Ford because they give us fast, dependable service."

FORD TRUCKS COST LESS—LAST LONGER

Using latest license registration data on 10,502,351 trucks, life insurance experts prove Ford Trucks last Longer.

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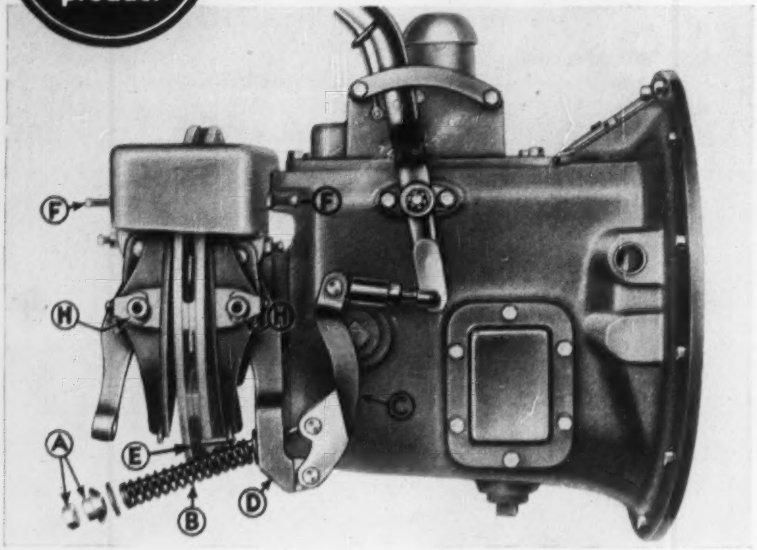
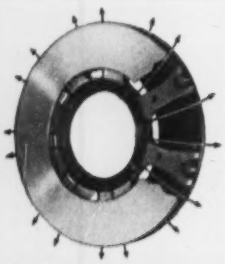
TRU-STOP Brakes



How TRU-STOP Brakes save more money than they cost!

TRU-STOP performance in just one emergency may more than offset any additional first cost. But their true economy shows up when it comes time to adjust or reline.

TRU-STOP brakes are adjusted and relined *without dropping the drive shaft.* Both are quickly and easily done with only a few simple tools. Down time is reduced to a minimum.



Longer Lining Life

• The terrific heat generated in braking cuts lining life. TRU-STOPS quickly dissipate this heat. Most of the disc is exposed to the air even during braking. And a cooling jet of air circulates through the disc, prolongs lining life.

See how easily adjustment is made
(illustration above)

1 Tighten nut A so that spring B exerts enough pressure to bring lever C to stop solidly against lever arm D.
2 Insert 1/32" shim between front shoe lining and disc and adjust pull-rod to maintain this clearance, first being sure to have hand-lever in full release position.
3 Further tighten nut A so that rear shoe lining is firm against disc but so that shim in front can still be removed. Remove shim.
4 See that tension spring E is in place, then adjust screws F so that linings are parallel with disc.

See how easily relining is accomplished

1 Remove nut A.
2 Remove spring E.
3 Apply hand lever so that rear arm can be swung back clear of tie rod and spring.
4 Remove shoe pin locks H, and drop shoe.
5 Replace relined shoes and adjust as per instructions.

For full details write for booklet

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Obituaries

Charles Derleth Jr., 81, retired dean of the college of engineering at the University of California in Berkeley and a prime figure in the development of the Bay Area's bridge system died June 13 in Berkeley. Prof. Derleth was a graduate of the College of the City of New York and Columbia University. He came to Berkeley in 1903 and in 1908 he was made a full professor and dean of the college of civil engineering. From 1930 to 1939 he was dean of the college of engineering. He retired in 1944. Prof. Derleth served on the board of engineers for the Golden Gate Bridge and served as a consulting engineer for the Bay Bridge and the Richmond-San Rafael Bridge which is now under construction. He was chief engineer for the Carquinez Strait Bridge which connected the Bay Area directly with the Sacramento Valley in 1927.

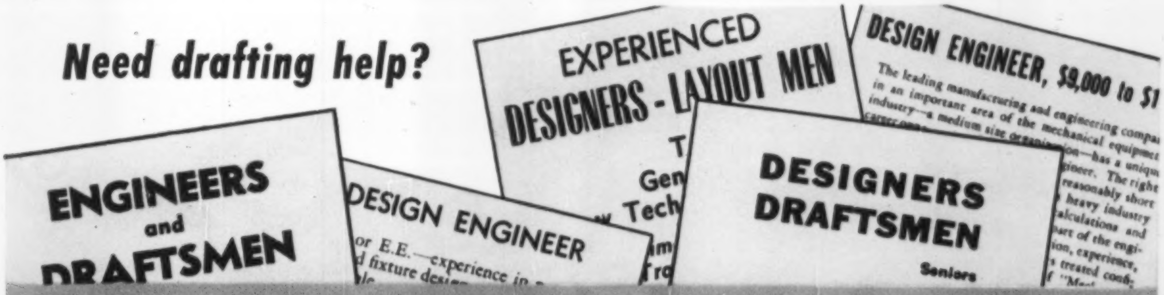
William H. Nalder, 71, former chief designing engineer of the Bureau of Reclamation, and among the nation's leading authorities on irrigation and power structures, died May 31. He had retired in 1952 after a 43-year professional career with USBR. A graduate of Washington State College, Mr. Nalder had worked on projects in Washington and Montana before transferring to the Bureau's Denver engineering offices in 1917. Appointed assistant chief designing engineer in 1931, he worked on Hoover, Grand Coulee, Shasta and other projects of the bureau since that time.

George C. Diehl, 83, superintendent of highways for Erie County, N. Y., died May 26. Noted as a pioneer in highway construction, he was a graduate of Rensselaer Polytechnic Institute, and after his retirement in 1934 had devoted himself to professional society activities. At his death, he was treasurer of the American Society of Consulting Engineers.

William Albert Heindle, 87, former president of Heindle-Samworth Construction Co., died June 18 in Wilmington, Del. Prior to forming his own firm, Mr. Heindle served with the J. G. White Company in a supervisory capacity on the construction of railway systems abroad. He was an 1891 graduate of Lehigh University.

Fred N. Poole, 60, of New Bern, N. C., a construction inspector for the North Carolina State Highway Department since 1919, died at New Bern May 29.

Need drafting help?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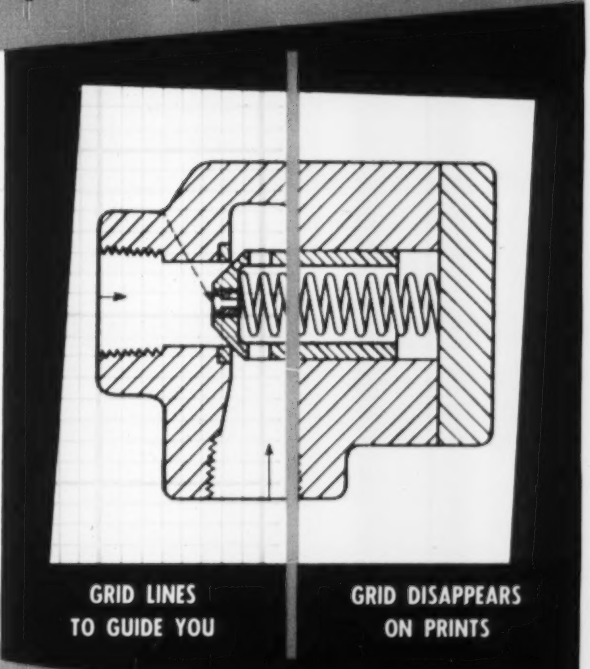
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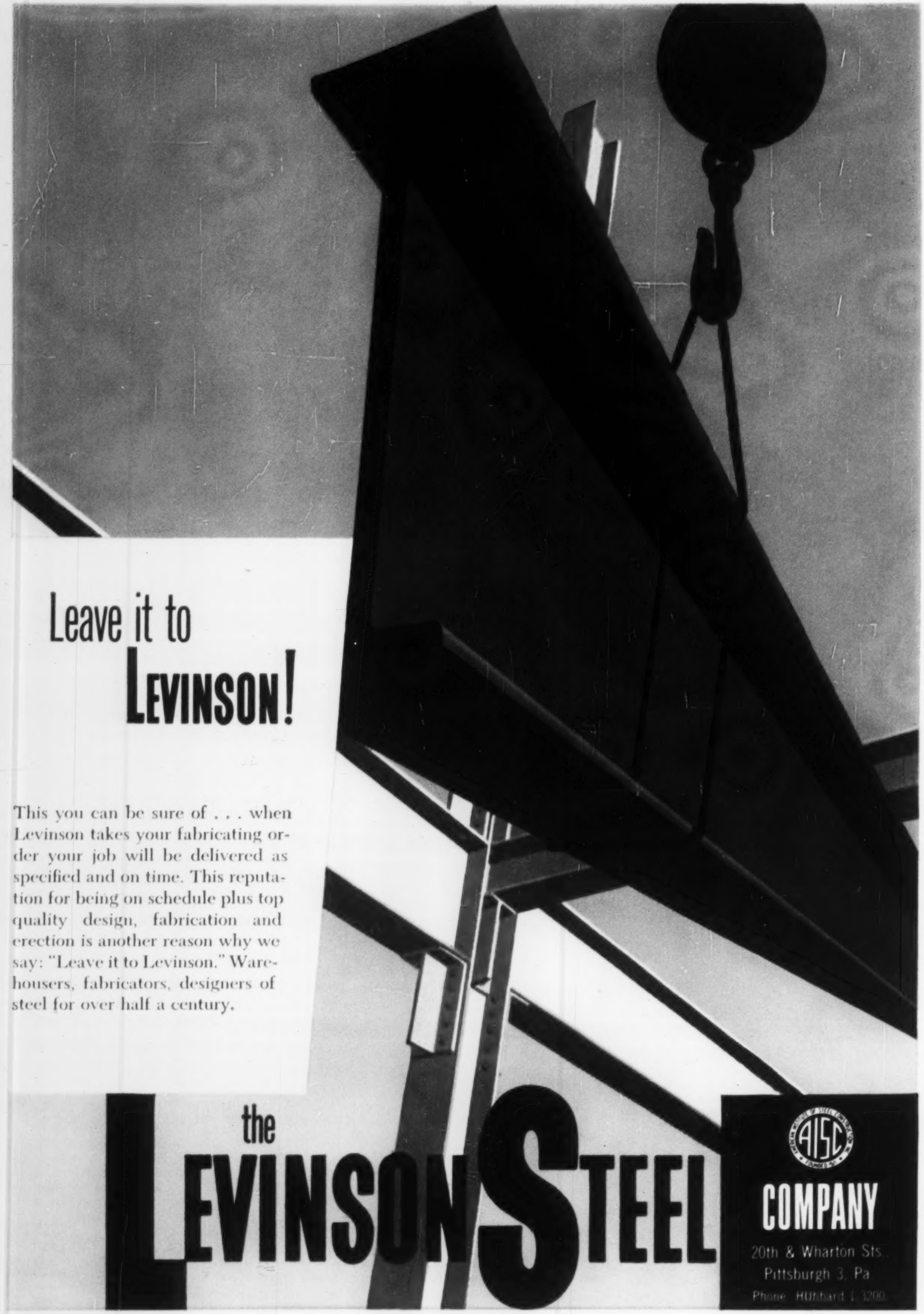

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Unit Prices

Where the Industrial Building Dollar Goes

This is How Five Types of Buildings Range in Cost

Type of building	per sq ft of floor area Min	Aver	Max	per cu ft of volume Min	Aver	Max
Control Room	$15.00	$18.00	$30.00	$1.50	$1.80	$2.50
Laboratory	20.00	28.00	40.00	1.70	2.40	3.30
Machine Shop	25.00	26.00	27.00	1.25	1.30	1.35
Process Building	7.24	10.85	16.28	0.40	0.60	0.90
Factory	7.00	7.25	7.40	0.46	0.47	0.48

. . . And this is what these Dollars Buy

Type of building	Control Room	Laboratory	Machine Shop	Process Bldg	Factory
Type of construction, frame	Steel	Steel	Steel	Steel	Steel
outside walls	Masonry	Concrete	Concrete Block	Corr Asbestos	Masonry
Date construction started	1955	1955	late 1956	late 1956	2-1-56
Location of building	Various	Various	Albany, N.Y.	Trenton, N.J.	Long Island, N.Y.
Reported by	West Coast Engr-Constrs.		Industrial Estimating Service, New York, N.Y.		
Height, stories	1 & B	1 & B	1	1	1
Floor area, sq ft	2,000	3,000	20,000	11,000	4,085
Volume, cu ft	24,000	36,000	400,000	199,000	62,000
% air conditioned	Pressurized	30	....	....	....
Principal Items of Cost	% of Total	% of Total	% of Total	% of Total	% of Total
Excavation and site improvement	4	3	1.97	1.7	2.4
Foundations	10	6	8.58^a	15.6^a	6.7
Structural frame	7	5	12.50^b	33.9^b	15.5
Cement finish work	1	..	......	....	5.9
Exterior masonry	12	10	5.30	....	13.7
Interior partitions	6	5	1.90	7.7	2.0
Carpentry and millwork	2	2	......	....	2.4
Sash and glazing	1	1	3.18	5.6	2.5
Doors	1	1			0.7
Roofing	5	3	......	....	3.8
Insulation	..	..	1.66	1.7	7.4^c
Waterproofing and dampproofing	1		......	....	....
Metal lath, furring, plastering	2	2	0.88	....	1.7
Hollow metal work	1	1	......	....	....
Misc iron and ornamental metal	4	3	0.25	....	....
Tile, terrazzo, marble	..	1	0.52^d	1.7^d	....
Floor covering	1	1	......	....	0.6
Painting	1	1	1.33	3.1	1.0
Finish hardware	1	1	......	....	0.5
Acoustical ceilings	2	1	......	....	....
Plumbing	8	9	1.20	4.5	8.0
Heating, ventilat, air cond	15	12	6.14	16.5	10.0^e
Electrical work and light fixtures	15	12	4.80	8.0	3.7
Equip for production purpose	..	10-30	49.79	....	....
Demolition	..	..	......	....	3.7
General conditions	..	..	......	....	7.8

^{a} includes floors ^{b} includes roofing ^{c} roof plank ^{d} tile walls and floors ^{e} heating only

The five types of industrial buildings shown here range from a minimum $7 per sq ft for a factory to a maximum $40 per sq ft for a laboratory where equipment accounts for 10 to 30 percent of total costs and is averaged at 20 percent in the table.

The factory, for light industry, does not include production equipment. Here foundations account for almost 7 percent of the total cost, the steel frame takes 15.5 percent, exterior masonry almost 14 percent, heating and ventilating 10 percent, plumbing 8 percent, electrical work 3.7 percent.

These cost analyses are supplied through the courtesy of a west coast Engineering-Constructor and of the Industrial Estimating Service, New York.

Air-Conditioned Machine Shop in Texas

This steel-frame machine shop and two-story office building will cost $7.37 per sq ft with complete summer-winter air conditioning, but only $7.275 per sq ft, if the machine shop air conditioning is omitted.

The shop building accounts for 59,500 sq ft including the machine shop, shipping department, storage, a shop office, toilets, lockers, showers. The office building adds 8,132 sq ft. Besides offices it houses reception room, drafting, printing and store rooms, conference room, vault and the usual service facilities. Total cost with full air conditioning is $522,919. Wyatt C. Hedrick is architect-engineer for Gray Tool Co., both of Houston.

This low unit cost was achieved by using structural clay tile as interior finish under corrugated steel exterior wall panels.

Prime contractors with lump sum contracts are:

	Contract	% of Total	Cost per sf
Totals	$522,919	100%	$7.7325
General: Tellepsen Const Co	318,685^a	60.94	4.7120
Plumbing: Bill Swanson Plumbing Co	23,977	4.59	0.3355
Electrical: Strauss-Frank	91,666^b	17.53	1.3550
Heating, Ventilating, Air Conditioning: Howard P. Foley	73,096^b	13.98	1.0810
Sprinkler System: Grinell Co.	15,495	2.96	0.2290

^{a} includes $4,000 to incorporate sub-contractors; to add ¾% heavy duty topping to concrete floors, add $9,100; and to supply cranes and hoists, add $32,000. ^{b} To omit A/C from machine shop: subtract $30,568 from Electrical and $198 from HVA/C contracts.

IF IT'S A

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Materials and Labor Prices Monthly Market Quotations by ENR Field Reporters

See following ENR issues for OTHER PRICES:

- July 12 — Iron and Steel Products; Pipe
- July 19 — Wood Products, Glass, Explosives, Chemicals
- July 26 — Clay Products, Lime, Plaster Paint, Roofing,
- Aug. 2 — Wage Rates, Building Board Lath, Insulation

CEMENT, AGGREGATE, READY-MIXED CONCRETE—F. O. B. CITY

	PORTLAND CEMENT* Per bbl. C/L lots cash, dis. not deducted			SAND AND GRAVEL Per ton, carload lots			CRUSHED STONE Per ton, carload lots		CRUSHED SLAG Per ton, carload lots, f.o.b. plant		CONCRETE BLOCK 8x8x16-in.* truckload del.* per block		CONCRETE Ready Mixed 1:2:4 ave. 50 c.y., del.
	Paper	Bulk	Mortar	Gravel, 1½ in.	Gravel, ¾ in.	Sand	1½ in.	¾ in.	1½ in.	¾ in.	Sand grav.	Lt. wgt. agg.	
Atlanta	$4.12a	$3.71a	$3.55	$2.75	$2.75	$2.50‡	$2.14	$2.24	$1.45	$1.65	$0.18	$0.195	$13.75g
Baltimore	4.04a	3.63a	3.43	2.70‡a	2.70‡a	2.20‡a	2.75‡a	2.80‡a	1.95‡a	1.90‡a	.18	.18a	12.15
Birmingham	3.73	3.00af	....	2.53n	2.53n	2.13n	2.75	2.75	1.55	1.65	.18	.18	11.55
Boston	4.75be	4.29a	4.55e	3.00a	3.00a	3.00a	1.65a	1.75a	....	....	.23	.275a	14.00h
Chicago	3.98a	3.57a	3.72	3.60‡b	3.60‡b	4.00‡b	3.75‡b	3.75‡b	2.25‡	2.25‡	.24	.24b	13.00
Cincinnati	4.20c	3.80c	3.89	2.19‡c	2.24‡c	2.24‡•	2.54‡c	2.54‡c	....	....	.205	.25a	12.40
Cleveland	N.A. in C.L.	3.59	....	2.15ef	1.95f	1.65	4.30‡a	4.30‡a	3.30‡a	3.30‡•	....	.23	16.15
Dallas	3.35a	2.95a	3.23	2.42	2.53	1.84	2.22	2.38	....	....	.11e	.2675	11.25
Denver	4.59a	4.09a	4.59	1.90	2.05	1.20		....	....	....	.22	.245a	10.70
Detroit	4.05a	3.45a•	3.70	4.25‡b	4.25‡b	4.00‡b	3.75‡	3.75‡	3.50‡	3.50‡	.22	.22a	14.20
Kansas City	4.30b	4.10b	4.10	1.65	1.65	2.10‡a	2.00‡a	2.00‡a	....	....	.20a	.24c	13.00b
Los Angeles	5.12ch	4.66ch	5.60	2.41‡a	2.76‡a	2.41‡a	2.41‡a	2.46‡a	....	....	.145fm	.255m	12.96lh
Minneapolis	4.49a	4.08a	3.99	2.70‡ag	2.70‡ag	1.60‡ag	3.25‡ag	3.25‡ag	....	....	.19	....	13.10f
Montreal	3.11d	2.86d	3.50	1.95‡a	2.20‡a	2.25‡a	1.95‡i	2.20‡i	....	....	.20	.20a	10.80ek
New Orleans	3.55a	3.15a	3.48	2.44	2.44	2.00	....	....	1.45	1.65	.275	....	13.65
New York	4.41a	4.00a	3.73	3.05bk	3.05bk	2.00bk	2.90bl	2.90bl	....	....	.24	.255b	15.70an
Philadelphia	3.88/4.27‡a	3.57/3.94‡a	3.49/4.12‡	2.85‡op	2.85‡op	2.35‡op	2.70‡	2.80‡	2.00	2.35	.22/.28	....	13.20de
Pittsburgh	4.15a	3.76a	3.75	2.40‡	2.40‡	2.20‡	2.60‡	2.60‡	2.15	2.15	.25d	.31	14.00
St. Louis	3.86/4.18e	3.46/3.78e	3.71/4.03	3.25am	3.10am	2.40/3.10am	1.60j	1.70j	....	....	.22	.28c	12.90
San Francisco	4.03e	3.59e	....	2.02	2.02	2.12	2.17	2.17	....	....	.24	.28cl	12.50c
Seattle	4.30a	3.75a	....	4.00‡bm	4.00‡bm	4.00‡bm	4.50‡bm	4.50‡bm	....	....	.26	.37	13.30j
Toronto	3.97	3.77	3.77	2.25‡	2.25‡	1.85‡	2.00	2.00	2.00	2.00	.25	.31c	14.15

‡ Delivered. * Prices incl. dealers discount except as noted.

CEMENT: •a Less 10¢ disc, 15 days. •b Less 2% disc, 15 days. •c Less 10¢ disc, 10 days. •d Truckload lots, deliv. 10¢ disc, 20 days. •e Truckload lots •f Fob mill, add $13.11 to $19.16 per car switching charges •g fob mill & freight •h LCL.

SAND GRAVEL, STONE & SLAG: •a Truck lots. •b Per cu. yd. •c 5 tons or more. •e ⅓". •f Pea gravel. •g Less 5% for cash. •h Less than 5 tons. •i Plus 5% mun. & prov. tax •j F.o.b. quarry. •k Barge lots add. •l F.o.b. scow Hudson river. •m Less 2% for cash. •n F.o.b. cars. •o 1–3 mi zone. •p Add 10¢ for ea. add'l mi zone.

CONCRETE BLOCK: •a Cinder •b Waylite. •c Haydite. •d Celocrete •e 5¼ x 8 x 12 in. •f 8 x 4 x 16. •g F.o.b. truck at job. •h Less 2% for cash •l F.o.b. plant San Rafael. •m F.o.b. yard.

READY MIXED CONCRETE: •a 5 cu. yds. or over del. Man. •b 25 cu. yds or more •c 10–100 cy. brackets. •d 1–3 mi. zone. •e 2,000 lb comp. •f 2,500 lb. comp. •g Less 25¢ disc, 15 days. •h Less 50¢ for cash. •i 5% off for cash. •j 2% off for cash. •k Federal tax included. Add 5% mun. & prov. •l 1:2½:3½. •m F.o.b. yard. •n Plus escalator clause. •o Add 15¢ for ea. add'l 3-mi zone.

CASH DISCOUNTS CEMENT to Contractors: Truck delivery, 2% for cash on 10th of month; on carload deliveries, no trucking, same as dealer cash discount 10¢ per bbl. for payment within 15 days of date of invoice. Subject discount 10¢ per bbl. 20 days in Montreal.

CURRENT MAXIMUM PRICES AT CEMENT MILLS

Charge for bags not included. For paper bags add 40¢ per bbl., not refundable.

	Bulk		Bulk		Bulk		Bulk		Bulk
Richard City, Tenn	$3.15†	Buffington, Ind	$3.10†	Steelton, Minn	$3.20†	Muskegon, Mich	$3.15†	Toledo, O	$3.15†
Clinchfield, Ga	3.15†	Independence, Kan	2.95†	Leeds, Ala	3.00†	Saginaw, Mich	3.15†	Milwaukee, Wis	3.20†
Kingsport, Tenn	3.15†	Hannibal, Mo	3.10†	Duluth, Minn	3.20†	Wyandotte, Mich	3.15†	Green Bay, Wis	3.20†
West Des Moines, Iowa	3.20†	Northampton, Pa	3.05†	Hudson, N. Y	3.05†	Buffalo, N. Y	3.25†	Ironton, O	3.15†
Nazareth, Pa	3.05†	Universal, Pa	3.20†	Alpena, Mich	3.05†	Oswego, N. Y	3.30†	Montreal City	2.56†
Bath, Pa	3.05†	Waco, Tex. (+ 10¢ tax)	3.10†	Detroit, Mich	3.15†	Cleveland, O	3.20†	W. Winfield, Pa	3.20†
Lesley, Pa	3.05†	Giant, S. C	3.25†	Howes Cave, N. Y	3.05†	Alsen, N. Y	3.05†	Security, Md	3.05†

† *Prices to hold for Third quarter of 1956.*

PAVING BRICK, BLOCK, ASPHALT, ROAD OILS—F. O. B. CITY

	PAVING BRICK AND BLOCK			PAVING ASPHALT Per ton, less than 80 penetration		ASPHALT BINDERS—FLUXES Per gal., 80–300 penetration		CUTBACK ASPHALT MC per ton		ROAD OIL	ASPHALT EMULSION RSI Per gal.	
	Granite Per M lots of 50,000 4x4x8 in.	Brick per M 3x4x8½ in. carload lots	Wood per sq. yd. 3½ in. 16-lb. treat	Tank car	Drums	Tank car	Drums	Tank car	Drums	Per gal. Tank car	Tank car	Drums
Atlanta	......	......	......	$27.60	$40.00	$0.15	$0.25	$0.114Pw	$0.276Pw	$0.15	$0.15	$0.25
Baltimore	150.00‡	......	......	21.00i	......	.085i	0.175i	.09iwE	.18iwE	.09i	.095i	0.185i
Birmingham	......	62.00i	......	......	......	......	......	......	......	......	......	......
Boston	......	......	......	22.00ap	35.00ap	22.00as	30.00as	.095aFw	.195aFw	.095a	.095aG	.175aG
Chicago	150.00‡	85.00‡b	3.95/4.00‡j	21.85b	31.85b	20.85bv	30.85bv	.10bwH	.18bwH	.08b	......	......
Cincinnati	......	......	......	......	......	......	......	......	......	......	......	......
Cleveland	......	82.00d	5.60g	23.00A	......	23.00A	......	.1025AwF	......	......	.1025AG	.20AG
Dallas	e	40.00	e	24.45	43.19	.1030	.1858	28.91	50.44	.098	.1087	.1960
Denver	......	50.00	......	......	......	......	......	......	......	......	......	......
Detroit	......	112.00	......	29.65	......	29.65v	......	.1285wI	......	.1026	......	.25
Kansas City	e	e	e	7.00cl	......	18.60v	......	.085*wJ	......	.075c	0.125	......
Los Angeles	e	......	e	18.50dmx	......	18.50dvx	......	20.00dxK	......	19.00dv	.09j	.19j
Minneapolis	......	......	3.33h	26.50	......	25.00	......	0.115w		0.105	.1242	......
Montreal	e	e	e	27.00n	39.60n	.135n	.198n	16.50nuE	20.90nuE	.132n	.197ns	.239ns
New Orleans	......	......	......	17.60e	......o	17.60es	......o	.085ew	......o	.085B	.09BL	......
New York	......	......	3.90f	23.89qCD	44.56qD	23.89stCD	44.56stD	.1073wCDF	.1939wDF	......	.1073CD	.1939D
Philadelphia	175/185	110/120	4.06	22.00	......	22.00	......	.095uF	......	.095	......	......
Pittsburgh	165.00	48.00	4.60	27.00	38.00	.10	.21	27.00E	40.00E	.098	.11	.224
St. Louis	......	......	......	20.63O	......	.1764	......	.0925fwM	......	0.16	.105	......
San Francisco	......	70.00c	......	20.50g	37.50g	20.50gkv	37.50gkv	21.50gN	39.00gN	21.25vr	.0925y	.1825v
Seattle	......	......	......	24.50z	38.50h	18.75hv	......	26.00K	......	22.25hv	.0925h	.1025hr
Toronto	......	......	4.40	33.80	55.14	3.19	0.24	0.20w	0.25w	0.20	0.20	.24

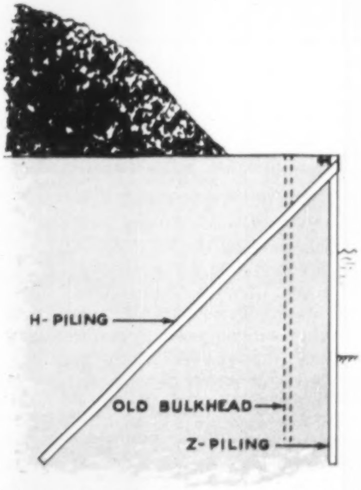
‡ Delivered.

PAVING BRICK & BLOCK: •a CL. •b 3 x 4 x 8. •c 2¼ x 8¼ x 4. •d LCL, truck deliveries. •e Not used. •f 2" interior 8¢ treat. •g 3" •h 2" tr, 8¢ •i 3 x 3⅛ x 8½. •j 2½", 6 lb. tr.

ASPHALTS: •a Price at plant, Everett, Mass. •b F.o.b. refinery, Lockport, Ill. •c F.o.b. Sugar Creek, Mo. •d F.o.b. refinery, El Segunda. •e F.o.b. Baton Rouge. •f F.o.b. Hartford, Ill. •g F.o.b. Richmond, Calif. •h F.o.b. Martinez. •i F.o.b. refinery, Baltimore. •j F.o.b. refinery, Inglewood, Calif. •k 50–110 penetr. •l Less than 100 penetr. •m 40/80 penetr. •n Fed. tax included; add 5% for mun. & prov. •o Drums not avail. Shipped in steel bbl. •p 60/70 penetr. •q 40/85 penetr. •r In customer's drums. •s Shipped in drums, per drum. •t 85/200 penetr. •u Per 100 gal. •v Per ton. •w Per gal. •x Also tank trucks. •y F.o.b. Oakland •z F.o.b. Edmonds •A F.o.b. refinery, Cleveland. •B F.o.b. Destrehan, La. •C Bulk. •D Prices based on transporting to Manhattan via truck. •E RC. •F Also RC. •G Also MS, SS. •H RC 0–5 incl. •I MC 4. •J MC, RC .0675. •K MC 3, 4 & 5. •L MS. •M MC 1–5, RC 1–5, .089. •N MC 3. •O fob Roxanna, Ill •P F.o.b. refinery Savannah: $0.09/gal., tank cars; $0.20/gal., drums.

New bulkhead at Long Island Lighting Company's Glenwood Landing, L. I., coal dock. Piling contractor was J. Rich Steers, Inc., New York. After installation, tension piles were cut flush with Z-Pile bulkhead and capped with a plate. Bethlehem supplied the Z- and H-Piles.

Steel-pile bulkhead at coal storage dock installed without moving coal piles



Tension-pile anchorage was used because coal pile could not be moved to install conventional tie-rod anchorage.

When the old dock front at Long Island Lighting Company's Glenwood Landing coal pier had to be replaced with a new Z-Piling bulkhead, it was impossible to interrupt the utility company's operations for the length of time necessary to move the coal pile. The contractor was therefore unable to install a bulkhead with a conventional tie-rod anchorage.

The solution was to use a tension-pile anchorage with 60-ft H-Piles driven at a 45-deg angle between alternate pairs of Z-Piles along the 300-ft frontage. The Z-Piles used in the bulkhead are 44 ft long, have a 14-ft freeboard, and were driven in approximately 15 ft of water. In driving the H-Piles, the hammer was held at a 45-deg angle by coaxial cables. After driving to refusal in sand, the H-Piles were cut off and capped with a plate flush with the bulkhead.

Bethlehem supplied 170 lengths of Z-Piling for the new bulkhead, as well as the H-Piles for the tension anchorage.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

Construction Reports

Bids Asked—Low Bidders—Contracts Awarded—First Section—

Compiled by Business News Department—Engineering News-Record, 330 W. 42nd St., New York 36, N. Y., ELSIE EAVES, Manager
J. A. MAHONEY, M. WETZEL, L. M. FELIX, F. S. DEMBEK, Reports.
J. H. WEBBER, M. R. ROESSLER, E. R. HUBER, Statistics.

NEW ENGLAND

BUILDINGS—BA

▲ **Mass., Orange**—SCHOOL—BA 7/12—Towns of Orange and Erving, Ralph C. Mahar, Regional School Dist. Comn., c/o Supt. Schools, Orange, Junior-Senior Regional School, $1,700,000. Plans deposit $100, refundable. Extended date. Rich & Tucker Assoc., 45 Newbury St., Boston, Mass., archts. Cleverdon, Varney & Pike, 120 Tremont St., Boston, structural engrs. CD 6/8.

▲ **Vt., Rutland**—HOSPITAL—BA 7/17—Rutland Hospital, John R. McLaughlin, pres., Nichols St., (selected list of bidders) hospital, $2,000,000. Ellerbe & Co., First Natl. Bank Bldg., St. Paul, Minn., archts.-engrs. CD 6/29/54.

▲ **Conn., Fairfield**—SCHOOL—BA 7/18—Town, School Bldg. Comn., Town Hall, Osborne Hill Elementary School. $1,000,000. Plans deposit $25. Lyons & Mather, 211 State St., Bridgeport, archts. CD 5/9.

HEAVY CONSTRUCTION—LB & CA

▲ **James S. Kelliher**, 1245 Hancock St., Quincy, Mass. CA **$1,373,548**, est. $1,367,000. W-702 Contr. No. 1, Commonwealth Pier No. 5, modernization and renovation, South Boston, BOSTON, MASS. Commonwealth of Mass., Port Boston Comn., c/o Div. Bldg. Constr., 38 Chauncy St., Boston, Mass. CD 5/31, under LB.

CONNECTICUT—State Hy. Comn., State Office Bldg., Hartford,

Enfield Road Constr. Co., Inc., Depot Hill, Warehouse Point, Conn., CA **$734,393**, Proj. 19-43, two span continuous welded plate girder bridge with skew span, 90 ft. each over Quinnebaug River and 5,731 lin. ft. b. conc., relocation Rte. US 6, Brooklyn and Killingly, Windham Co. Bids May 7, awarded June 15. CD 5/10, under LB.

BUILDINGS—LB & CA

▲ **A. J. Pinney Co., Inc.**, 220 Dwight St., Springfield, Mass. CA **$2,499,500**. HIGH SCHOOL, Silver St., GREENFIELD, MASS. Town, School Bldg. Comn., c/o Supt. Schools, 125 Federal St., Greenfield, Mass. CD 5/25, under LB.

Gellatly Constr. Co., 181 Sylvan St., Bridgeport, Conn. LB **$434,800**. TOWN HALL, Church Hill Rd. and Main St., TRUMBULL, CONN. Town Office First Selectman, Town Hall, Trumbull, Conn. Bids June 8. CD 5/9.

▲ **State P. Wks. Dpt.**, 165 Capitol Ave., Hartford, Conn., rejected bids June 13, central OFFICE for State Hy. Dpt. and Hy. Dist. I Garage, WETHERSFIELD, CONN. LB **$3,375,000**. Will re-advertise. CD 6/15, under LB.

▲ **Bartlett-Brainard Co.**, 580 New Park Ave., West Hartford, Conn. CA, **$2,500,000**. 1 story, 210,000 sq. ft. MANUFACTURING BLDG., rear of existing bldg., WINDSOR LOCKS, CONN. Hamilton Standard Div., United Aircraft Corp., Bradley Field, Windsor Locks, Conn. Awarded June 21. CD 5/31.

MIDDLE ATLANTIC

BUILDINGS—BA

N. Y., Herricks—SCHOOL—BA 7/10—Bd. Educ., Union Free School Dist. No. 9, town of North Hempstead, Herrick School, Herricks Rd., North Hempstead, Herricks Elementary School addn., and conversion of existing bldg. into junior high school. Plans deposit $75 for general constr.; $50 for plumbing and sanitary work, heating and ventilating work and site imprvs. Warren H. Ashley, 967 Farmington Ave., West Hartford, Conn., archt.

N. J., Point Pleasant—SCHOOL—BA 7/19—R. C. Diocese of Trenton, 155 W. Warren St., 2 story, brick, block school, $750,000, Thomas Henry Moran, Princeton, archt. CD 1/16.

† **N. Y., West Milton**—ASSEMBLIES BLDG.—BA 7/24—Atomic Energy Comn., Schenectady Operations Office, P.O. Box 1069, Schenectady, SAR critical assemblies bldg., 130x200 ft. L-shaped laboratory and testing bldg., Inv. AE-56-SCH-196. $750,000-$900,000.

HEAVY CONSTRUCTION—LB & CA

† **U. S. Eng.**, Niagara and Bridge Sts., Buffalo 7, N. Y., cancelled bids to have been opened about June 25, Grass River Lock approach channel, St. Lawrence Seaway, St. Lawrence River, for St. Lawrence Seaway Development Corp., CIVENG 30-023-56-71, NEW YORK. CD 4/30.

† **Goslin Birmingham Mfg. Co., Inc.**, 3521 Tenth Ave., N., Birmingham, Ala. CA **$644,400**. Item No. 1 operating machinery for Lock Gate and Item No. 2, operating machinery for lock valve, St. Lawrence Seaway Development Corp., CIVENG 30-023-56-45, NEW YORK. U. S. Eng., Niagara and Bridge Sts., Buffalo, N. Y. Bids June 5, awarded June 18. CD 5/9.

† **Gasparini Excavating Co.**, 1439 Main St., Peckille, Pa. CA **$817,473**. flood control proj., Wellsville, Allegany Co., NEW YORK. U. S. Eng., Niagara and Bridge Sts., Buffalo, N. Y. CD 5/29, under LB.

▲ **Magnus International**, 1604 Walnut St., Phila., Pa. LB **$564,999**. sewage treatment plant and pumping stations, AVALON, N. J. Avalon Sewerage Auth., Avalon, N. J. Bids June 11. CD 3/21, under LB.

Cestone-Palladino Constr. Co., Inc., Montclair, N. J. LB **$478,915**. sewer mains, sys. (Avalon, N. J.).

† **Williard Inc.**, Germantown & Sedgley Aves., Phila. 33, Pa., CA, **$458,610**. underground heating distr. lines and interior heating for 22 nose hangars McGuire Air Force Base, ENG 36-109-56-60, WRIGHTSTOWN, N. J. U. S. Eng., 2635 Abbottsford Rd., Phila., Pa. Bids May 29. CD 4/26.

McElwee-Courbis Constr. Co., 6209 Crescent Blvd., Camden, N. J. CA **$800,000**. sewage disposal plant, pump station, incl. control laboratory bldgs. addns., alterations, UNIVERSITY PARK, PA. Penn State University, University Park, Pa. Bids June 5. CD 5/24.

▲ **Wright Contg. Co.**, Odenton, Md. LB **$1,899,000**. (8 bidders) 84-in. Herringrun Park transmission main, BALTIMORE, MD. City, Bureau Water Supply, 505 Municipal Bldg., Baltimore 2, Md. Bids June 20. CD 6/7.

† **Nickles Bros.**, 4309 Gallatin St., Hyattsville, Md. LB **$403,300**. Item 1; **$331,700**. Item 2; improve potable water sys., Naval Powder Factory, NOY 92004, INDIAN HEAD, MD. Dist. P. Wks. Office, Potomac River Naval Command, Naval Gun Factory, Wash., D. C. Bids June 19. CD 6/1.

Donaldson Paving Co., 20 Potomac Ave., S.W., Wash., D. C., LB **$663,495** (4 bidders) repairing asphaltic pavements and concrete bases, various locations, WASH., D. C. D. C. Govt., Dpt. Hys., 499 Pa. Ave., N.W., Wash., D. C. Bids June 15.

BUILDINGS—LB & CA

† **U. S. Eng.**, Niagara and Bridge Sts., Buffalo 7, N. Y., cancelled bids to have been opened about July 10, ADMINISTRATION Bldg., St. Lawrence Seaway, Massena, for St. Lawrence Seaway Development Corp., CIVENG 30-023-56-32, NEW YORK. CD 5/8.

▲ **R. A. Culotti Constr. Co.**, 6609 S. Salina St., Syracuse, N. Y. LB **$1,055,000**. HOSPITAL addns., OGDENSBURG, N. Y. A. Barton Hepburn Hospital, Ogdensburg, N. Y. Bids June 19. CD 5/24.

Wildwood Haven Corp., c/o Edward Baker, 224 E. Oak Ave., Wildwood, N. J. Separate Contracts. **$840,000**. RESIDENTIAL DEVELOPMENT, 240 units, Green Creek, Delsea Dr., CAPE MAY COURT HOUSE, N. J.

Nicosia Bros., 83 Broadway, East Paterson, N. J. Owner Builds. **$850,000**, 40 HOUSES, Boulevard and Elmwood Dr., EAST PATERSON, N. J. C. J. Kordys, 116 Passaic St., Passaic, archt.

Marlyn Manor, c/o David Kanoppenberger, Wildwood Crest, N. J. and **John Giulfrida**, North Wildwood, N. J. Separate Contracts. **$450,000**. RESIDENTIAL DEVELOPMENT, 50 houses, Delsea Dr., ERMA, N. J.

† **R. M. Duval Constr. Co., Inc.**, 54-State Hy. No. 17, Paramus, N. J. LB **$469,714**. two REGIMENTAL DISPENSARY BLDGS., two BATTALION HEADQUARTERS BLDGS., two other BLDGS., ENG-36-109-56-66, FORT DIX, N. J. U. S. Eng., 2635 Abbottsford Rd., Phila., Pa. Tetronic Assoc., Somerville, N. J., archts. Bids June 13. CD 2/13.

Bush Realty Co., 206 Cedarcroft Ave., Audubon, N. J. Separate Contracts. **$500,000**. RESIDENTIAL DEVELOPMENT, Charleston Ave., LAWNSIDE, N. J. William Duble, Merchantville, N. J., archt.

A. S. Parker, Broad St., Red Bank, N. J. Owner Builds. **$675,000**, 27 HOMES, to be known as Greentree at Newman Springs Rd. and Everett Rd., LINCROFT, N. J. Harsen & Johns, Railroad and Summit Aves., Tenafly, archts.

Hartleigh Constr. Co., c/o Herman Jaffee, 1150 Springfield Ave., Irvington, N. J. CA Est. **$500,000**. MARKET SHOPPING CENTER, Main St., MADISON, N. J. Food Fair Stores, Inc., 230 Stiles Ave., Linden, N. J. Louis Kasoff, Tulip St., Phila., Pa., archt.

▲ **Marron & Co.**, 55 Franklin Ave., Ridgewood, N. J. CA Est. **$1,000,000**. 48 unit APARTMENT Bloomfield and Claremont Aves., MONTCLAIR, N. J. E. & L. Marron & Co., and Arthur Mattucci, 55 Franklin Ave., Ridgewood, N. J. Isadore Naftali, 312 High St., Newark 2, archt.

Ryan Constr. Co., 11 E. 42 St., New York, N. Y. CA **$400,000**. MANUFACTURING BLDG. off Rte. 202, RARITAN, N. J. Ortho Chemical Co., 44-26 Purves St., Long Island City, N. Y. Serge P. Petroff, 285 Madison Ave., New York 17, N. Y., archt.

John M. Gabriel, 3342 Highway 17, Paramus, N. J. CA **$950,000**. 38 HOUSES to be known as "East Brook Homes" on East Brook Dr., RIVER EDGE, N. J. East Brook, Inc., c/o John M. Gabriel, 3342 Highway 17, Paramus, N. J. Lester Cohen, 234 Clinton St., Hackensack, archt.

Orchard Constr. Co., c/o Beck Realty Co., 102 Englewood St., Englewood, N. J. CA **$450,000**. 14 HOMES, Richard St. near Knickerbocker Rd., TENAFLY, N. J. Beck Realty Co., 102 Englewood St., Englewood, N. J. Percy Simon, 362 Cedar Lane, Teaneck, archt.

Philip Kruvant of Kruvant Constr. Co., 79 Lincoln Park, Newark, N. J. Owner Builds. **$980,000**, 49 HOMES, Grove Ave. and the Peckman River, VERONA, N. J.

Pineway Constr. Co., 2501 N. 33 St., Phila., Pa. CA **$800,000**. RESIDENTIAL DEVELOPMENT, Wanamaker Rd., ABINGTON, PA. Fairway Estates, Inc., c/o S. Polekoff, 2401 N. 33 St., Phila., Pa.

Victor Homes, 838 Federal St., Camden, N. J. Separate Contracts. **$800,000**. RESIDENTIAL DEVELOPMENT, incl. 60 houses, Church Rd. and Delaware Twp., ERLTON, PA. William Duble, Merchantville, N. J., archt.

Wark & Co., 1920 Sansom St., Phila., Pa. LB **$745,000**. junior high SCHOOL addns., alterations, paving, HAVERTOWN, PA. Haverford Twp. School Dist., Havertown, Pa. CD 6/8, under LB.

Levitt & Sons, Levittown, Pa. Separate Contracts. **$400,000**. Country Club SHOPPING CENTER (Sect. 2), supermarket, 12 stores, Rte. 1 and Rte. 413, LEVITTOWN, PA.

▲ **Siesel Constr. Co.**, 4605 Fifth Ave., Pittsburgh, Pa. LB **$4,091,227**. 9 story, brick, concrete, steel HOSPITAL, McKEESPORT, PA. McKeesport Hospital, Fifth Ave., McKeesport, Pa. Bids June 7. CD 5/25.

Vance Judson Corp., c/o C. Williams, Mill Rd. and Stratford Ave., Melrose Park, Pa. Separate Contracts. **$440,000**. RESIDENTIAL DEVELOPMENT, incl. 40 houses, 3400-3500 blocks Grant Ave., PHILA., PA. W. L. Winchell, 212 Rock Glen Rd., Phila., archt.

E. H. Keefer & Son, 1321 Rodman St., Phila., Pa. LB **$750,000**. 3 story, brick, bsmnt., Donner RADIOLOGICAL CENTER, PHILA., PA. University of Penna., 209 S. 36 St., Phila., Pa. Bids May 22. CD 5/10.

† **B. J. Lucarelli Co.**, 22 Orchard St., Jersey City, N. J. LB **$749,761**. general constr., 2 company enlisted men's BARRACKS, site imprvs., utilities, Signal Depot, TOBYAHANNA, PA. U. S. Eng., 2635 Abbottsford Rd., Phila., Pa. Bids June 12. CD 5/11.

John K. Ruff, Inc., 100 W. 22 St., Baltimore, Md. CA Est. **$425,000**. brick, concrete steel **Brooklyn** Telephone CENTER, BALTIMORE, MD. Chesapeake &

(Continued on page 144)

PROJECTS COVERED

By Size

Construction projects here reported cover the United States and Canada, are of these minimum sizes or larger: water supply, earthwork, waterways $44,000; other public works $73,000; industrial buildings $93,000; other buildings $344,000. Also Foreign projects of $100,000 and more in size of interest to American contractors.

By Regions & Classes of Construction

(In order of Listing)

BIDS ASKED
LOW BIDDERS
CONTRACTS AWARDED

New England
Middle Atlantic
South
Middle West
West of Mississippi
Far West

PROPOSED WORK
Water Supply
Sewers, Waste Disposal
Bridges
Streets & Roads
Earthwork, Waterways
Public Buildings
Mass Housing
Commercial Buildings
Industrial Buildings
Unclassified

In These Stages

PROPOSED WORK: **Before and including appointment of engineers or architects.**

BIDS ASKED: **BA (new announcements only). For full calendar, see also preceding issues.**

SOON LETS CONTRACT: SLC

LOW BIDDERS: **LB On jobs below $500,000 in value all low bidder news will be the final reports published on the projects involved except where award is not made to the low bidder. In this case, a supplementary contract award report will be published.**

CONTRACTS AWARDED: **CA Except awards to low bidders previously reported in low bidder stage.**

CD dates shown are of Construction Daily issue in which last previous report was published.

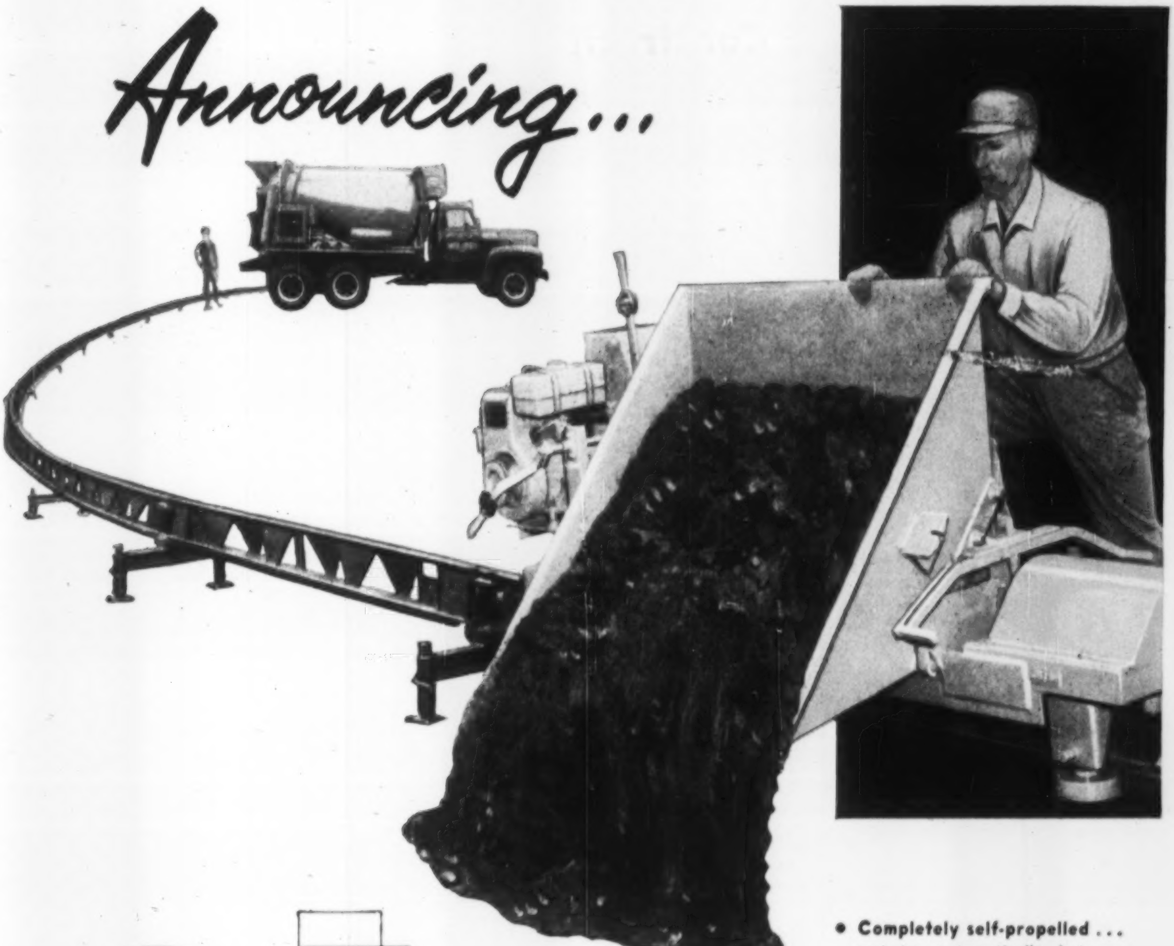
OWNERS, ENGINEERS, ARCHITECTS, CONTRACTORS are invited to report their new jobs for listing in these reports when they meet or exceed the size minimums shown above. Address these news releases to J. A. Mahoney, REPORTS, ENGINEERING NEWS-RECORD, 330 W. 42 St., New York 36, N. Y.

Symbols and Abbreviations Include:

† **Federal Government**
▲ **Project of $1,000,000 or over.**
ENR **Engineering News-Record**
CD **Construction Daily**

For additional reports see Construction Daily.

Announcing...



REX® RAIL PORTER

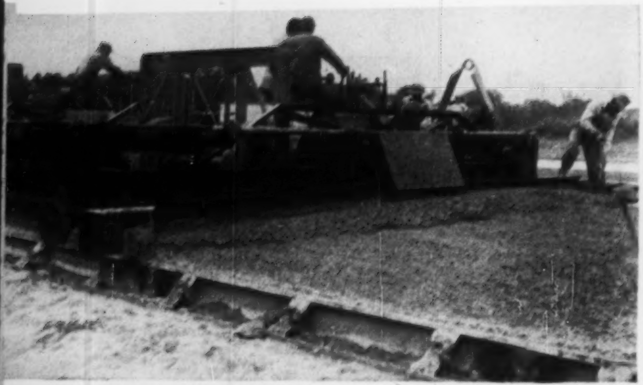
the revolutionary new way to transport construction materials

The Rex Railporter, a completely new tool for the construction industry, will go anywhere on its single rail. The Railporter, when loaded at the point of supply is sent on its way by simply engaging the clutch lever for the desired direction of travel. The Railporter follows the rail to its destination where it stops automatically. One man can dump the hopper and return the Railporter to its loading point by engaging the clutch. Ask for Rex Railporter Bulletin No. 56-47. Write Chain Belt Company, 4633 W. Greenfield Ave., Milwaukee 1, Wisconsin.

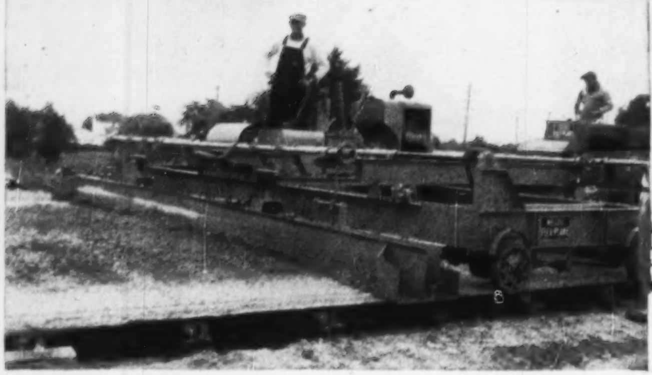
- **Completely self-propelled . . .** operates automatically between loading and discharge points.
- **Operates anywhere . . .** in any weather, over any ground condition — reinforcements, muddy terrain, open cuts, excavations, tunnels, water or elevations.
- **Fast set up . . .** 100 ft. of rail easily laid by two men in less than 20 minutes. Eliminates costly, old-fashioned wooden runways . . . runs on lightweight, long-lasting sectional steel rails.
- **Large pay loads . . .** Railporter, complete with trailer unit, handles as much as 26 cu. ft. of materials (liquid volume). Carries liquid, bulk, package, block and other construction materials.
- **Simple to operate . . .** one lever controls forward and reverse. Stops automatically at any pre-selected point along rail.

CONSTRUCTION REX MACHINERY

CHAIN BELT COMPANY



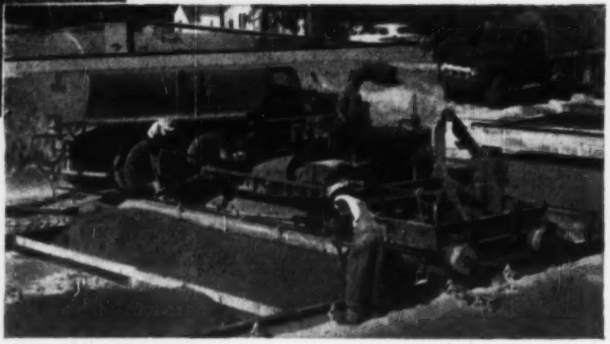
Two Flex-Plane Finishers used in tandom by A. J. Baltes Construction Co., on section of Ohio Turnpike



Western Contracting Co. operated two more on still another section of Ohio pike.

FLEX-PLANE

J. C. O'Connor and Sons operate Self-Widening Flex-Plane on section of Indiana Turnpike.

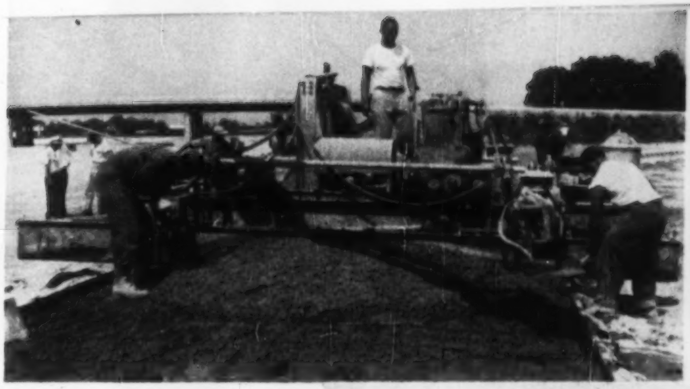


J. A. Tobin uses Flex-Plane working low slump concrete on section of U. S. 69 near Kansas City, Mo.

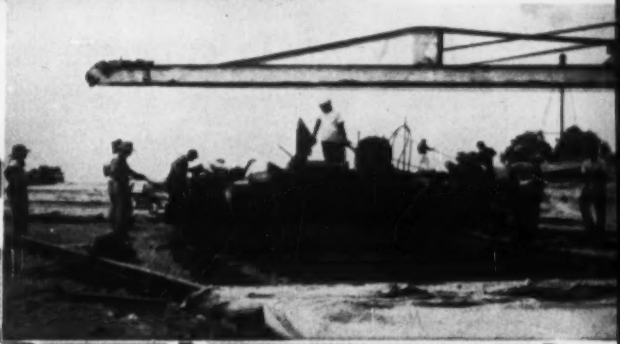
Heltzel
WARREN, O

THE FLEXIBLE ROAD JOINT MACHINE COMPANY
Flex Plane
MECHANIZED CONSTRUCTION EQUIPMENT
WARREN, OHIO

WORLD'S LARGEST BUILDER



Self-widening machine used by Peter Kiewit on a midwestern turnpike interchange.



The Flex-Plane machine takes gradework in stride. Here Harrison Construction Co. works cloverleaf with a self-widening unit.

.....the nation's most popular Finishing Machine

Here's the finishing machine that has outsold all others for the past two years. The Flex-Plane has been the most flexible machine of its type ever built . . . and the 1956 model is no exception.

Upon a sturdy triple-lap frame, that extends hydraulically at the flick of a finger, is a power-packed engine that will easily handle the toughest finishing jobs. Users often work them without spreaders.

There is the Flex-Plane originated hydraulic transportation rig that transforms the machine into its own trailer in a matter of seconds. And, the Flex-Plane Self-Widening feature, that proved so popular last year, has been improved for 1956.

Add to these outstanding features the new Flex-Plane screed that holds rigid and true under any condition, yet takes a crown speedily, with a minimum of down time. Remember, too, Flex-Plane screeds are outside the frame where they belong for easy maintenance and better finishing.

Again we say, look them all over, talk to users, and we're sure you, like dozens of other leading contractors, will specify Flex-Plane Finishers from this point on.

THE FLEXIBLE ROAD JOINT MACHINE COMPANY
7600 Thomas Road
Warren, Ohio

While working turnpike Calumet Construction Co. found Flex-Plane flexibility paid dividends.

On Garden State Parkway the Weldon Construction Co. put their second Flex-Plane through its paces.

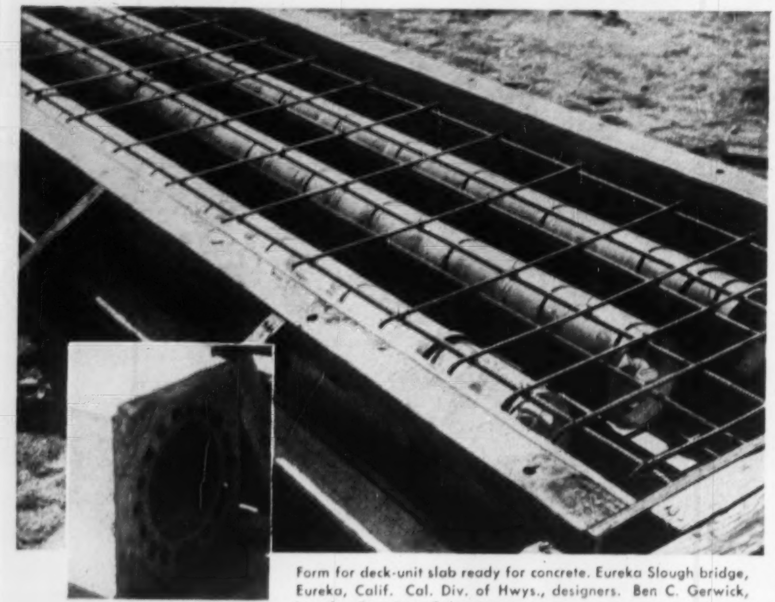
The Union Building and Construction Corporation uses a pair of Flex-Planes to finish slabwork on Indiana Turnpike.

OF CONCRETE FINISHING EQUIPMENT

SONOVOID®

FIBRE TUBES

for voids in concrete construction



End view of precast hollow pile.

Form for deck-unit slab ready for concrete. Eureka Slough bridge, Eureka, Calif. Cal. Div. of Hwys., designers. Ben C. Gerwick, Inc., San Francisco, Cal., contractors.

Economical bridge design features use of ***Sonovoid*** *Fibre Tubes!*

Low-cost SONOVOIDS were used in both the precast, pretensioned concrete piles and deck-unit slabs for this 947-foot bridge across Eureka Slough.

This is considered to be one of the more economical bridge designs of the California Department of Highways.

The 139 piles vary in length from 45 to 105 feet, but each is 20 inches square and contains a 12 inch O.D. SONOVOID and 18 Roebling ⅜-inch, 7-strand pretensioning cables. There are 252 deck-unit slabs 30 feet long, 4 feet wide and 15 inches deep, each containing three 8-inch O.D. SONOVOIDS and 35 Roebling cables.

Low-cost SONOVOIDS eliminate the dead weight of concrete at the neutral axis . . . and save you money! Use SONOVOID Fibre Tubes in concrete bridge deck, wall, floor and roof slabs and in forming hollow piles . . . either precast units or units cast in place.

Available in sizes from 2.25" to 36.9" O.D. up to 50' long. May be ordered in desired lengths or sawed to your requirements on the job. End closures also available.

For complete technical information and prices, write

SONOCO PRODUCTS COMPANY
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HARTSVILLE, S. C.
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MONTCLAIR, N. J. 14 SOUTH PARK STREET
AKRON, IND • LONGVIEW, TEXAS • BRANTFORD, ONT. • MEXICO, D. F.

(Continued from page 140)

Potomac Telephone Co., 5 Light St., Baltimore 2, Md. Bids May 31. CD 5/21.

Skinker & Garrett, 2607 Connecticut Ave. N.W., Wash. 8, D. C., CA, **$536,000.** 6 story, brick, concrete WAREHOUSE and offices addns., WASH., D. C. Peoples Drug Stores, Inc., 77 P. St. N.E., Wash., D. C. Bids May 15. CD 5/21, under LB.

Varmar Builders, 1501 Beech St., Wilmington, Del. Separate Contracts. **$600,000.** RESIDENTIAL DEVELOPMENT, DuPont Rd., etc., WILMINGTON (P.O. New Castle), DEL.

SOUTH

BUILDINGS—BA

▲ N. C., **Raleigh**—STATE OFFICE—BA 7/24—State Bd. P. Bldgs. and Grounds, Agriculture Bldg., Raleigh, 4 story 120,000 sq. ft. state office bldg., New Bern Ave. and Tarboro Rd. $1,000,000. Holloway-Reeves, 2620 Hillsboro St., archts. CD 6/27.

BUILDINGS—SLC

Ala., Montgomery—HOSPITAL—St. Jude's Hospital, W. Fairview Ave., soon lets contract rehabilitation of poliomyelitis victims bldg. $500,000. CD 1/6/53.

HEAVY CONSTRUCTION—LB & CA

NORTH CAROLINA—State Hy. and P. Wks. Comn., Raleigh,

E. B. **Towles Constr. Co.,** Box 1617, Wilmington, N. C. CA **$592,975.** subgrade rein. CABC, b. conc. binder 7.72 mi. connection from U. S. 421 at Monkey Jct. 7.5 mi. south of Wilmington, N. W. via Winter Park to jct. with U. S. 17, east of Wilmington, Proj. 3595 S 868 (1), New Hanover Co. Bids May 29, awarded June 19. CD 6/5, under LB.

FLORIDA—State Road Dpt., Tallahassee,

Brinson Constr. Co., Box 2209, Tampa, Fla., CA **$595,470.** Sarasota Pass, Perico Bayou and Palma Sola Bay Bridges approaches, SR 64. Job 1315-175. Contr. 11, Manatee Co. Bids Apr. 3, awarded June 19. CD 4/10, under LB.

▲† **Brown & Root Marine Operators, Inc.,** Industrial Rd., Houston, Tex., LB **$2,641,594,** two offshore platforms, Navy Mine Defense Laboratory, NOy 91132, Spec. 49090, PANAMA CITY, FLA. P. Wks. Office, Naval Base, Charleston, S. C. Bids June 19. CD 6/5.

Vanguard Constr. Corp., 369 Lexington Ave., New York, N. Y. CA **$719,177,** sewage treatment plant, WEST PALM BEACH, FLA. City, 320 Second St., West Palm Beach, Fla. Bids May 28. CD 6/20, under LB.

▲† **J. A. Jones Constr. Co.,** 209 W. 4 St., Charlotte, N. C. CA **$3,842,480.** earth dam and gated spillway, Warrior Lock and Dam near Eutaw, ALABAMA. U. S. Eng., 2301 Grant St., Mobile, Ala. Bids June 14. CD 5/25.

Sullivan & Cozzart, 822 W. Kentucky St., Louisville, Ky. LB **$742,000.** addns., alterations to Lee Terminal, Standiford Field, LOUISVILLE, KY. Louisville & Jefferson County Air Bd., Standiford Field, Louisville, Ky. Bids June 20. CD 6/4.

BUILDINGS—LB & CA

▲ **J. W. Bateson, Inc.,** Gibraltar Life Bldg., Dallas, Tex., LB **$7,955,588** (base bid plus 43 additives) (5 bidders) construct and finance, Capehart Family HOUSING, 107 bldgs. with total of 600 units, ENG-44-110-56-25, FORT EUSTIS, VA. U. S. Eng., foot of Front St., Norfolk 1, Va. Bids June 20. CD 5/28.

▲† **John A. Volpe Constr. Co.,** 1507 M St. N.W., Wash., D. C., LB **$3,275,000,** Item 1; LB **$3,190,000,** Item 2 (7 bidders) Guadalcanal Area CENTRAL CAMP, Marine Corps School, incl. 3 story bachelor officers' quarters and mess bldg.; 2 story academic bldg., heating plant and utilities, incl. roads, walks, outside services, NOy 91991, QUANTICO, VA. Dist. P. Wks. Office, Potomac River Naval Command, Naval Gun Factory, Wash., D. C. Bids June 20. CD 5/18.

▲ **Arnold Constr. Co.,** 7 Murray Bldg., Palm Beach, Fla. CA **$6,286,913.** teaching HOSPITAL at J. Hillis Miller Health Center, University of Florida, GAINESVILLE, FLA. State Bd. Control, Tallahassee, Fla. Bids June 4. CD 6/19, under LB.

MIDDLE WEST

BUILDINGS—BA

▲ **Mich., Port Huron**—Y.M.C.A. BLDG.—BA 7/18—Young Men's Christian Assn., S. Davison, pres., 937 Sixth St., Y.M.C.A. bldg., $1,250,000. Plans deposit $50, refundable. Wyeth & Harman, Inc., 1602 Military Ave., Port Huron, archt. CD 2/16/54.

BUILDINGS—SLC

▲ **Ill., Chicago** — ORPHANAGE, etc. — Angel Guardian Orphanage, 2001 W. Devon Ave., soon lets contract orphanage addn., office, auditorium, gymnasium, grade and high school, infirmary. $1,750,000. Gaul & Voosen, 228 E. Superior St., archts. CD 6/13.

HEAVY CONSTRUCTION—LB & CA

H. W. **Miller Constr. Co., Inc.,** 1511 Neave St., Covington, Ky., LB **$593,900,** covering reservoir, Winton and North Bend Rds., CINCINNATI, O. City, City Hall, Cincinnati, O. Bids June 20. CD 6/14.

▲† T. C. **Bateson Constr. Co.,** 6800 Denton Dr., Dallas, Tex., LB **$12,177,039,** est. $8,095,455, (4 bidders) nuclear engineering test facility, incl. engineering test reactor bldg., high level radiation bldg., nuclear engineering laboratory, waste and storage treatment plants, guard house, necessary utilities, Wright

Patterson Air Force Base, ENG-15-029-56-53, DAYTON, O. U. S. Eng., 830 W. Broadway, Louisville, Ky. Bids June 22. CD 6/18.

† **Lieb-Jackson, Inc.,** 337 S. High St., Columbus, O. CA **$532,000.** rehabilitation heating plant, Bldg. 170, Wright Patterson Air Force Base, ENG-15-029-56-42, DAYTON, O. U. S. Eng., 830 W. Broadway, Louisville, Ky. Bids June 7, awarded June 13. CD 5/15.

▲ **INDIANA**—State Hy. Dpt., State House Annex, Indianapolis,

Ind.—**Olinger Constr. Co.,** Huntingburg, Ind. LB **$1,465,654,** est. $1,511,252 (4 bidders), c. conc. R4042, S302 (7), S 302 (8), S 302 (9), Crawford Co.;

Ind.—**L. P. Cavett Co.,** Lockland, O. LB **$293,149,** est. $359,437 (5 bidders), wid'n., resurf., RS 4035, F 163 (4), Jennings and Bartholomew Counties;

Ind.—**Rock Road Constr. Co.,** 5915 N. Rogers St., Chicago, Ill. LB **$192,919,** est. $228,109 (4 bidders) wid'n. resurf., RS 4036, F 221 (7), Boone Co.;

Ind.—**Fauber Constr. Co.,** Lafayette, Ind. LB **$178,837,** est. $181,941 (2 bidders), bit. wid'n. RS-4040, ST-674 D, ST-74 N, ST-271 D, Tippecanoe Co.;

Ind.—**Ryan Constr. Co., Inc.,** 800 E. Michigan St., Evansville, Ind. LB **$199,328** (2 bidders), bit. coated aggregate pavement, R 4011, ST-494 B, ST-628 F, Perry Co.;

Ind.—**Ralph Rogers & Co.,** S. Adams St., Bloomington, Ind. LB **$119,957,** est. $121,304 (1 bidder), hot asph. c. conc., R 4012, ST-847 A, Monroe Co.;

Ind.—**Rieth-Riley Constr. Co.,** Goshen, Ind. LB **$227,597,** est. $276,539 (3 bidders) bit. resurf., RS-4033, F 13 (25), ST-13 L, Henry Co.;

Ind.—**Grady Asphalt & W. J. Grady,** 6101 College Ave., Indianapolis, Ind. LB **$82,371,** est. $82,910 (1 bidder) bit. resurf., RS-4044, Hancock Co.; LB **$126,228,** est. $127,694 (1 bidder) bit. resurf. RS 4045, Hancock and Madison Counties; LB **$86,762** (4 bidders) wid'n. resurf., RS 4037, F 246 (26) Marion Co.;

Ind.—**Wm. D. Vogel Constr. Co.,** 3760 E. St. Clair St., Indianapolis, Ind. LB **$1,479,672,** est. $1,580,186 (5 bidders) rein.-con., R4041, F 24 (5), Hamilton Co.; LB **$147,468,** est. $153,642 (3 bidders), bit. resurf., RS-4034, F-13 (27), Marion Co. Bids June 19. CD 6/4 and 6/12.

WISCONSIN — State Hy. Comn., State Office Bldg., Madison,

L. G. Arnold, Inc., P.O. Box 228, Eau Claire, Wis., CA, **$746,156,** grading, base, pavement and structures 1.116 mi. Proj. U-08-3 (26) Contract No. 1, U.S. Hy. 53, Chippewa Co. Bids June 5. CD 5/18.

MICHIGAN—State Hy. Dpt., Stevens T. Mason Bldg, Lansing,

Sugden & Sivier, Inc., 13100 Cloverdale St., Oak Park, Mich. CA **$875,087,** est. $870,000 bridges, etc., pedestrian and vehicular, 4 retaining walls, BUI B45- of 82-22-12 C2-U0, BUI B46 C2-U0, of 82-22-12 BUI B60, etc., Wayne Co. CD 6/14, under LB.

BUILDINGS—LB & CA

▲ **Fred W. Entenman, Inc.,** 3323 Secor St., Toledo, O. CA Est. **$1,750,000.** DeVeaux Village SHOPPING CENTER, 33,800 sq. ft. parking for 410 cars. TOLEDO, O. Sylvania-Douglas Realty Co., C. Rowland Johnson, pres., 2041 Shenandoah St., Toledo, O. Sidney H. Morris & Assocs., 134 N. LaSalle St., Chicago, Ill., archts. Awarded June 15.

▲ **Ray J. Benoit,** Box 168, Kankakee, Ill., CA **$1,092,618.** 1 and 2 story JUNIOR HIGH SCHOOL, Plum St., AURORA, ILL. School Dist. 129, 152 Glenwood St., Aurora, Ill. Bids May 23. CD 5/15.

Walter Joslyn Constr. Co., 7925 S. Halsted St., Chicago, Ill., LB **$435,372.** DeWitte Cregier Vocational HIGH SCHOOL addn., 1820 W. Grenshaw St., CHICAGO, ILL. Bd. of Educ., 228 N. La Salle St., Chicago, Ill. CD 12/1:

J. A. Kemmler & Co., 10127 S. Western Ave., Chicago, Ill. CA **$449,500.** 2 story, brick Field Stevenson SCHOOL, Forest Park, FOREST PARK, ILL. School Dist. 91, Forest Park, Ill. Childs & Smith, 20 N. Wacker Dr., Chicago, Ill., archts.

WEST OF MISSISSIPPI

BUILDINGS—BA

Colo., Grand Junction—HEADQUARTERS, etc.—BA 7/17—Grand Valley Rural Power Lines, 120 N. 7th St., 1 story, 8,000 sq. ft. brick REA headquarters bldg., and 28 mi. rural distr. line. $504,000. Eugene D. Sternberg, 2434 E. 3 Ave., Denver, engr.-archt. CD 3/29.

HEAVY CONSTRUCTION—LB & CA

† **Massman Constr. Co.,** 3917 Broadway, Kansas City, Mo. LB **$473,981.** construct, repair pile and stone fill structures and revetment, Missouri River, Miner-Upper Sioux City Bends, Inv. 25-066-56-157, IOWA. U. S. Eng., 1709 Jackson St., Omaha, Neb. Bids June 15. CD 6/6.

TEXAS—State Hy. Comn., Austin,

Uvalde Constr. Co., P. O. Box 10286, Dallas 7, Tex. CA **$532,136,** grading, structures, storm sewers, c. conc. 2.215 mi. Hy. US 287. Proj. U 385 (20), Tarrant Co. Bids May 15. CD 5/18, under LB.

TEXAS—State Hy. Comn., Austin,

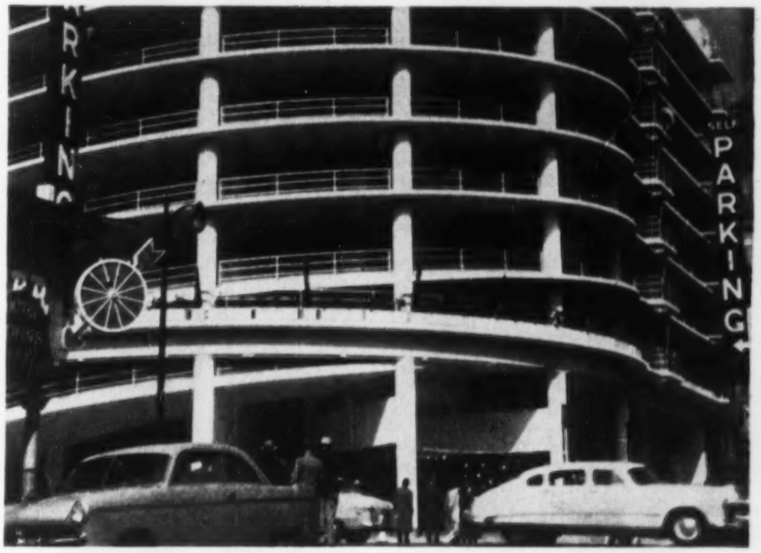
Gilvin-Terrill, Inc. and Road Builders, Inc., P.O. Box 2268, Amarillo, Tex. CA **$577,793.** grade separation structures 0.183 mi. US 60, 287. Hy. Proj. U 60 (9), Potter Co. Bids June 12. CD 6/15, under LB.

▲ **TEXAS**—State Hy. Comn., Austin,

Tex.—**South Texas Constr. Co.,** P.O. Box 3536, Corpus Christi, Tex. CA **$687,439.** flexible base and surf. 23.409 mi. Proj. F 712 (2), etc., Anderson Co.;

Tex.—**Spencer Constr. Co., Inc. and M. W. Grumbles,** P.O. Box 338, Dallas, Tex. CA $1,045,700. grading,

SONOTUBE®
FIBRE FORMS
for round columns of concrete



Downtown Center Parking Garage—San Francisco, Calif. Architect: George A. Applegarth. Consulting Engineers: Ellison and King. General Contractor: Cahill Construction Company

Low-cost **Sonotubes** *formed the supporting columns for this structure!*

This nine-story downtown parking garage in San Francisco, California, holds 1200 automobiles. Access to all nine floors is by concentric ramps. The framing is flat plate and steel reinforced round concrete columns.

The SONOTUBE-formed columns in the body of the building are spaced 26′ 6″ on centers in one direction and 25′ 0″ on centers in the other. Exterior SONOTUBE-formed columns on the two street fronts are placed 9′ back from the building lines and the floor slabs cantilever out from there 11 feet.

Speed up construction time, save money and labor . . . use SONOTUBE Fibre Forms to erect round columns of concrete.

SONOTUBES handle easily and require minimum bracing. Approved by architects and engineers, widely used by contractors.

Available in 26 sizes, from 2″ to 48″ I.D. up to 50′ long. Order in desired lengths or saw to your requirements on the job. Use Sonoco's patented "A-coated" SONOTUBES for finished columns, wax coated also available.

For complete technical information and prices, write

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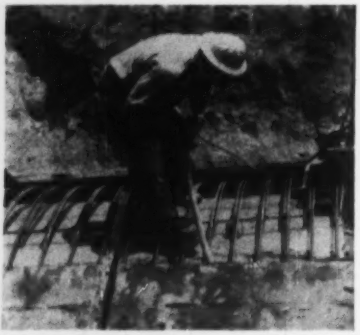
THE COMPACTNESS and lightweight portability of UniViber makes it easy for one man to handle . . . small size makes it easy to transport in trunk of ordinary car.

Extra Man Eliminated by Using UniViber Plug-in Vibrator

Motor in head design eliminates the hours wasted by workman dragging motor after the operator and provides greater flexibility in job application.

Motor in Head

UniViber power is a universal type motor connected directly to the eccentric weight it rotates. It may be plugged into any standard 115 volt AC or DC source. The motor is cooled by wet concrete surrounding the head. Speed approaches 10,000 rpm. More work can be done in less time, and with minimum danger of damage to forms by using the high speed low amplitude type of vibrator pioneered by VIBER.



Particularly adaptable for use in hard-to-reach places, UniViber may be tossed into the concrete and pulled back toward you . . . the UniViber vibrator manipulates effectively and easily by using the casing as a handle.

Greater Flexibility in Operating Techniques Reduces Costs

Wires leading to the head are protected by a flexible casing which also functions as a convenient handle. The easy-to-handle UniViber vibrator gives the workman more freedom of action because absence of moving parts in the casing allows increased flexibility. This new freedom enables the operator to employ new cost saving vibrating techniques.

Two Models Available

UniViber Model 1M3R is equipped with the Viber patented replaceable rubber tip. Model 1M3 has housing with steel nose. One piece VIBER patented eccentric weight is tapered to produce minimum vibration where brushes ride on the commutator. Another feature is splash lubricated non-metallic separator bearings, used so successfully in other VIBER vibrators.

VIBER COMPANY is a pioneer in the design and development of both internal and external vibrators. For further information on VIBER'S complete line of vibrators, contact your authorized distributor or Viber Company, Dept. 7D6, 726 So. Flower Street, Burbank, California.

VIBER

VIBRATORS SINCE 1931

drainage structures, grade separation structures 4.957 mi. Hy. US 75. Proj. U 515 (23), Dallas and Collin Counties;

Tex.—**Austin Bridge Co. & Worth Constr.**, P.O. Box 1590, Dallas, Tex. CA **$1,927,907**, c. conc. 1.701 mi. Hy. US 81, ST 31 and 6, Proj. UI 614 (10) etc., McLennan Co. Grand total $3,661,046. Bids June 12. CD 6/15, under LB.

TEXAS—State Hy. Comn., Austin,

R. B. Butler, Inc. & J. H. Howard, P.O. Box 471, Bryan, Tex. CA **$700,842**, roadbed tr., pavement 12.129 mi. Hy. US 82. Proj. F 315 (9), Red River Co. Bids June 13. Awarded June 21. CD 6/19, Under LB.

Ernest Loyd, 612½ W. 6 St., Fort Worth, Tex., LB **$898,040**. est. $950,000, (11 bidders) Marine Creek Dam and Cement Creek Dam, FORT WORTH, TEX. Tarrant County Water Control & Imprv. Dist. 1, c/o Joe B. Hogsett, pres., 503 Danciger Bldg., Fort Worth, Tex. Bids June 19. CD 6/1.

Gilpatrick Constr. Co., Riverton, Wyo. CA **$707,727**. paving, drainage, irrigation sys., RIVERTON, WYO. City, City Hall, Riverton, Wyo. Bids May 29, awarded June 12. CD 6/11, under LB.

COLORADO—State Hy. Dpt., 4201 E. Arkansas St., Denver,

Lowdermilk Brothers, 1950 W. Dartmouth St., Englewood Colo. CA, **$786,912**, est. $690,000. grading, structures 11.263 mi. between Utah State Line and Bedrock Colo. Proj. A-AA 15 (2) Montrose Co. Bids June 14, awarded June 19. CD 6/7.

BUILDINGS—LB & CA

Fuel Economy Engineering Co., New York Bldg., St. Paul, Minn. LB **$636,484**. (2 bidders) furnish labor and materials for BOILER UNIT and firing equip. at municipal power plant, AUSTIN, MINN. City, Bd. Water, Electric, Gas & Power Comrs., W. D. Dunlar, secy., Austin, Minn. Bids June 19. CD 6/14.

Standard Constr. Co., 250 Builders Exchange Bldg., Minneapolis, Minn. LB **$517,795**. (9 bidders) general constr., 2 story bsmnt., 212x123 ft. HIGH SCHOOL, Silver Bay, TWO HARBORS, MINN. Bd. Educ., Lake County School Dist., W. H. Norlen, clk., Silver Bay, Minn. Bids June 19. CD 6/14.

Dickie Constr. Co., 317 N. 11 St., St. Louis 1, Mo. CA Est. **$500,000**. PLANT for processing high purity chemicals, incl. 1 story, concrete block, 12,000 sq. ft. bldg. to house, mfg. units, plant laboratory, office, storage sheds, roadways, fences, on 150 acre tract ½ mi. east of here, HEMATITE, MO. Mallinckrodt Chemical Works, 3600 N. 2 St., St. Louis 7. Mo. Smith-Hanlon-Zurheide-Levy, Inc., 3926 Lindell Blvd., St. Louis 8, Mo., engr.

J. E. Morgan & Sons, Box 6029, Dallas, Tex. CA **$608,506**. CHURCH, DALLAS, TEX. Lovers Lane Methodist Church Congregation, 2814 Fairmount St., Dallas, Tex. Blum & Guerrero, 4930 Maple St., Zeigler, Houseman & Assocs., 1801 N. St. Paul St., Dallas, and Bennett & Crittenden, 2814 Fairmount St., Dallas, Tex., archts. Bids June 1.

▲ **Garrett Oil Tools, Inc.**, Longview, Tex. Own Forces. **$1,000,000**. mfg. PLANT, LONGVIEW, TEX. CD 6/21.

▲ **William Matera**, 1137 Basse Rd., San Antonio, Tex. LB **$1,575,000**. HIGH SCHOOL, VICTORIA, TEX. Victoria Independent School Dist., Victoria, Tex. Bids June 19. CD 6/6.

Howard Whitlock, Box 781, Pueblo, Colo. LB **$687,700**, est. $650,000. 2 story, 17,000 sq. ft. brick HOSPITAL, LEADVILLE, COLO. St. Vincent's Hospital, Leadville, Colo. Bids June 15. CD 6/7.

FAR WEST

BUILDINGS—BA

Calif., Santa Rosa—COUNTY OFFICE—BA 7/25—Sonoma Co., Court House, 1 story, 45,000 sq. ft., rein.-con. county office bldg. $750,000. Plans deposit $25. J. Clarence Felciano, 4010 Montecito Ave., Santa Rosa, archt. CD 10/19.

HEAVY CONSTRUCTION—LB & CA

† **W. R. Cahoon Constr. Co.**, Pocatello, Idaho, CA **$579,891**. est. $518,991, American Falls pumping plant and discharge line, Michaud Flats Proj., Spec. DC 4670. IDAHO Bureau Reclamation, Dpt. Interior, Rupert, Idaho. Bids May 22, awarded June 13. CD 6/4.

▲ **Midwestern-Johnson-Dixon** (Midwestern Constructors, Inc., 105 N. Boulder St., Tulsa, Okla., Johnson Western Contractors, Box 6, San Pedro, Calif. and L. E. Dixon, 409 S. Calif. St., San Gabriel, Calif.) CA Total est **$10,000,000**. 38.5 mi. 34-in. steel gas pipe line near Gilroy to Milpitas, Calif., 25 mi. from Panoche Junct. to west of Kerman to Llanada, east of San Benito, Calif. and from Topock, Ariz. 21.5 mi. westerly. ARIZONA and CALIFORNIA Pacific Gas & Electric Co., 245 Market St., San Francisco 6, Calif. CD 7/21/52.

▲ **WASHINGTON**—State Hy. Comn., Olympia,

Wash.—**Associated Sand & Gravel Co.**, 2508 Colby Ave., Everett, Wash., LB **$231,388** (2 bidders) drainage, grading, light bit. surf. and paving with unfinished c. conc. and Type I-1 b. conc. 7.053 mi. Primary St. Hy. 1, Mt. Vernon west and 2 St. in Mt. Vernon, Skagit Co.;

Wash.—**Curtis Constr. Co.**, N1401 Fancher Way, Spokane, Wash., LB **$177,617** (5 bidders) clearing, drainage, grading light bit. surf. 22.354 mi. Secondary St. Hy. 11, Columbia River North, Benton and Grant Counties;

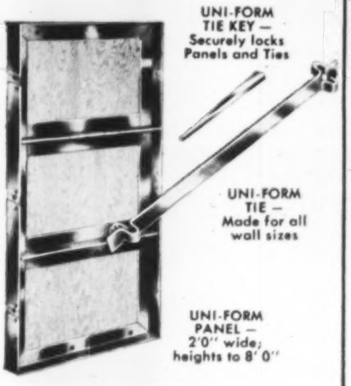
Wash.—**N. Fiorito Co.**, 844 W. 48 St., Seattle, Wash. LB **$538,502** (4 bidders) clearing, drainage, grading, light bit. surf., cement-treated base, b. conc. paving and widen 2 timber bridges 5.566 mi. Primary St. Hy.

(Continued on page 148)

UNI-FORM

Concrete Forms

3 SIMPLE ELEMENTS FORM ANY CONCRETE STRUCTURE


UNI-FORM TIE KEY — Securely locks Panels and Ties
UNI-FORM TIE — Made for all wall sizes
UNI-FORM PANEL — 2'0" wide; heights to 8' 0"

UNI-FORM Concrete Forms are prefabricated steel-framed, plywood faced panels . . . ready to use when they reach the job.
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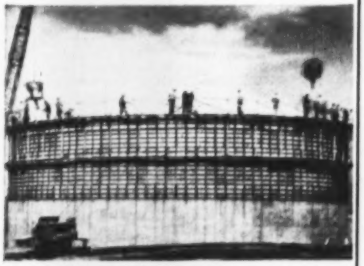

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UNI-FORMS provide faster, simpler and easier circular wall forming . . . one side alignment and bracing . . . absolute control of concrete, and safer, cleaner working areas.

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FORM CLAMP CO.
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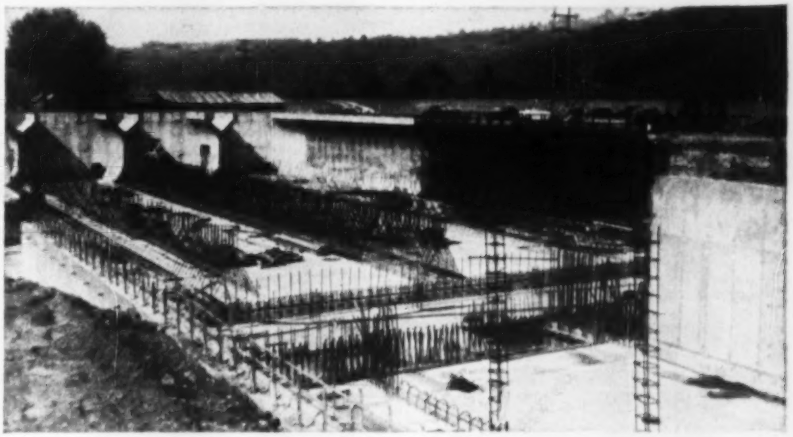
Unique Prefab Form System Speeds Sewage Plant "Y" Wall Construction



MECHANIZED FORMING with new "Y" wall trusses and UNI-FORM Panels speeds construction, saves labor and material

Field reports on a new system for forming "Y" walls in aeration tanks and settling basins indicate very satisfactory operation and important labor and material saving advantages for the system.

Developed by the Universal Form Clamp Co., Chicago, the new system is said to completely eliminate the many problems and difficulties encountered by contractors in forming this special type of wall in sewage disposal plant construction.

Specially designed trusses, which can be made to handle any type, height, shape or wall thickness, are used in conjunction with standard UNI-FORM Concrete Forms to form the "Y" wall. Assembly of the truss and UNI-FORM Panels into a complete form, ready to receive concrete is a fast, mechanical operation. Positive internal spreading and accurate wall thicknesses are assured by the use of Universal Spiroloc Cone Nut Assemblies.

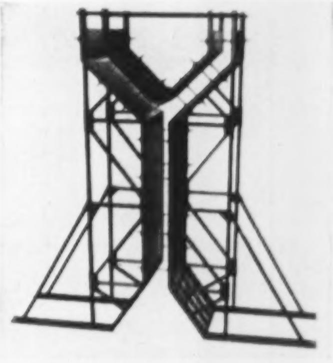
Features incorporated in the design and operation of the Universal "Y" wall forming system eliminate the necessity of additional lumber or tying devices for the alignment and bracing of the unit.

STRIPPED WALLS are clean and accurate

Erection, stripping and movement of the form can be handled either as individual pieces or as a large unit. Both methods have been very successfully used on recent projects.

Because standard UNI-FORM panels are used to form a large percentage of the "Y" wall contact area, it is possible to strip all UNI-FORM panels within a very short time after the actual pouring of concrete, leaving the trusses in place to provide the necessary support for the required period of time.

In this way, faster forming cycles, using minimum UNI-FORM equipment are possible, resulting in lower labor and material costs. UNI-FORM Panels are rented or sold, or rented with an option to purchase.



ASSEMBLED SECTION of "Y" wall truss with UNI-FORM Panels

For complete details on Universal "Y" wall forms and UNI-FORM Panels, Write:

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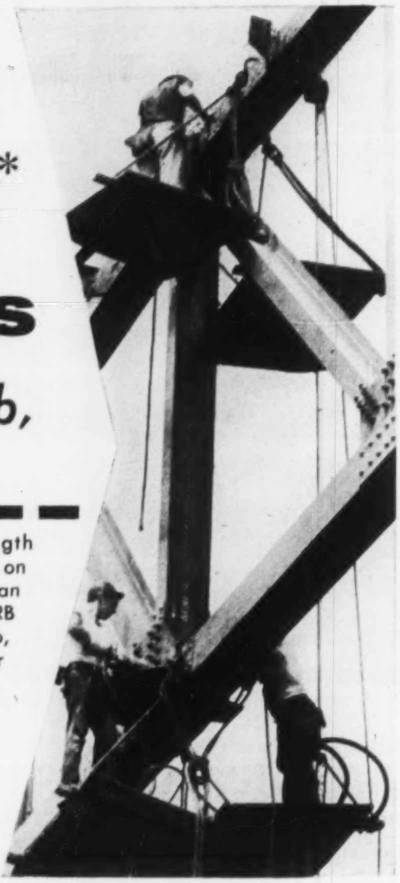

Wherever there's a high-strength bolted construction project going on today, the chances are better than even that you will find MIL-CARB Carburized Washers on the job, such as the one shown here, for which bolts, nuts and washers were supplied by **Russell, Burdsall & Ward Bolt and Nut Co., Port Chester, N. Y.**

To quote Mr. R. H. Burdsall, V.P. in charge of marketing: "Bolting this year will account for 10% of all construction, whereas two years ago it was less than 1% of the total. The economies to builders and contractors have already been demonstrated; the advantages to the public in avoiding the din normally associated with new construction is evident from scientifically conducted and tabulated noise tests, indicating that bolting decibel ratings are less than half those of riveting."

And because no bolt assembly is any better than its washers, high strength bolting should include the use of MIL-CARB Carburized Washers to prevent "galling" or grinding of the washer . . . *essential to permanent, uniformly strong, tight joints.*

MIL-CARB Washers are fabricated from Prime Carburizing Quality Special Soundness Steel to insure uniform quality control, always equal to or exceeding the rigid specifications for high strength bolted steel construction.

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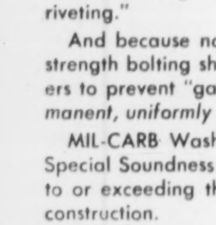

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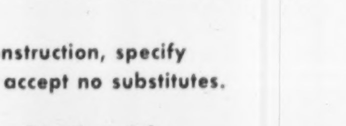

A 8925-⅔P

(Continued from page 146)

9, Bernard Creek north, FAP No. F-007-1 (16), Grays Harbor Co.;

Wash.—**F. R. Hewett Co.**, 1220 Ide St., Spokane, Wash. LB **$91,676** (2 bidders) stockpiling crushed stone surf., maintenance rock, crushed cover stone and mineral aggregates Primary St. Hys. 7, 10 and 18, Soap Lake to Stratford, et al, Grant Co.;

Wash.—**Interstate Asphalt Co.**, Aberdeen, Wash., LB **$81,001** (2 bidders) surf. and bit. surf. tr. plantmix type F on 4.219 mi. Primary St. Hy. 12, Palix River south, FAP No. F1004-1(2), Pacific Co.;

Wash.—**Pacific Sand & Gravel Co.**, Centralia, Wash., LB **$112,478** (1 bidder) clearing, drainage, grading, light bit. surf., cement-treated base, Type I-1 b. conc. paving install illumination sys. 0.877 mi. St. Hys. 1 and 1N, Mellen St. interchange and junction Primary St. Hy. 1 east et al, Lewis Co.;

Wash.—**J. D. Shotwell Co.**, 3113 S. Pine St., Tacoma, Wash., LB **$399,843** (1 bidder) clearing, drainage, grading, surf. cement-treated base, Type I-1 b. conc. paving, 4.479 mi. Primary St. Hy. 9, Ruby Beach south, Jefferson Co. Bids June 19. CD 6/5.

WASHINGTON—State Hy. Comn., Olympia,
Fiorito Bros., 1100 Leary Way, Seattle, Wash., CA, **$926,959** paving and slab bridge 0.44 mi. Primary State Hy. 1, Tumwater, Thurston Co. Bids June 12. CD 6/18, under LB.

WASHINGTON—State Hy. Comn., Olympia,
Morrison-Knudsen Co., Inc., 319 Broadway, Boise, Idaho, CA **$674,552,** substructure for bridge over Spokane River at Maple St., Spokane Co. Bids Apr. 17. CD 4/23, under LB.

† **J. P. Hopkins Co. Inc.**, Mercer Island, Wash., LB **$679,458,** est. $713,005 (3 bidders) two 12,420 sq. ft. barracks and officers quarters, two 9,130 sq. ft. and 9,590 sq. ft. admin., recreation and storage bldg., two mess halls, etc., at control and launching areas, ENG-45-1-8-56-18, Redmond and Midway, WASHINGTON. U. S. Eng., 4735 E. Marginal Way, Seattle 4, Wash. Bids June 18. CD **5/16**.

▲ **Duncan Constr. Co.**, and **U. S. Pipeline Co.**, Moses Lake, Wash., LB **$1,195,033** (8 bidders) constr. natural gas distr. sys. MOSES LAKE, WASH. City, City Hall, Moses Lake, Wash. Bids June 19. CD 5/17.

▲ **Johnson-Western Constructors**, Box 248, Coronado, Calif., CA, **$1,287,464,** Lakeside-Grossmont transmission line, LA MESA, CALIF. La Mesa, Lemon Grove & Spring Valley Irrigation Dist., 4769 Spring St. La Mesa, Calif. Bids May 29. CD 6/6, under LB; **Johnson-Western Constructors**, Box 248, Coronado, Calif., CA, **$776,468**. furnishing, installing aqueduct supply line and Monte connection line, Lakeside Creek (La Mesa, Calif.).

BUILDINGS—LB & CA

▲ **Homes & Son Constr. Co.**, 1420 E. Bethany Home Rd., Phoenix, Ariz., LB **$1,301,299,** est. $1,000,000 (6 bidders) 4 story NURSES' HOME and 3 story EDUCATION BLDG. and AUDITORIUM, PHOENIX, ARIZ. St. Joseph's Hospital, 350 W. Thomas Rd., Phoenix, Ariz. Bids June 19. CD 3/27.

▲† **Heftler Constr. Co.**, 9374 Brighton Way, Beverly Hills, Calif., LB **$1,829,000**. est. $1,883,160 (3 bidders) family HOUSING, Inv. 56-202, FORT LEWIS, WASH. U. S. Eng., 4735 E. Marginal Way, Seattle 4, Wash. Durham, Anderson & Freed, 1100 Denny Way, Seattle, Wash., archts. Bids June 22. CD **6/12**.

† **Ostruske-Murphy, Inc.**, 1515 Center St., Tacoma, Wash., LB **$541,319,** est. $510,121 (3 bidders) two DISPENSARIES and two POST-EXCHANGE BLDGS. Inv. 56-176, FORT LEWIS, WASH. U. S. Eng., 4735 E. Marginal Way, Seattle 4, Wash. Bids June 15. CD 5/9.

Midstate Constr. Co., 347 Clay St., San Francisco, Calif., LB **$503,000**. 1 story, 16,000 sq. ft. rein.-con. NURSING HOME BLDG., BAKERSFIELD, CALIF. Mercy Hospital, 2215 Truxton Ave., Bakersfield, Calif. Ellison Sedgwick & Assoc., 1045 Sansome St., San Francisco, Calif., engrs. CD 3/12.

Wm. C. Crowell Co., Inc., 170 E. California St., Pasadena 1, Calif., CA, **$714,000**. Sellers Elementary SCHOOL, GLENDORA, CALIF. Bd. of Educ., 440 W. Foothill Blvd., Glendora, Calif. Bids Apr. 20. CD 4/27, under LB.

Harold C. Geyer, 787 Munras Ave., Monterey, Calif. LB **$942,000** (4 bidders) 50,000 sq. ft. rein.-con. Monterey County HOSPITAL addn., SALINAS, CALIF. Monterey Co., Court House, Salinas, Calif. Jerome Kasavan, 7 Windham St., Salinas, archt. Stone, Mulloy, Marraccini & Patterson, 619 Calif. St., San Francisco, engrs. CD 3/14/45.

Cahill Bros., 250 Sansome St., San Francisco, Calif. CA **$575,000**. OFFICE alterations, SAN FRANCISCO, CALIF. 1st Western Bank, 405 Montgomery St., San Francisco, Calif.

Erbentraut & Summers, 676 Pennsylvania Ave., San Francisco, Calif., LB **$679,000** (7 bidders) 3 story, bsmnt., rein.-con. Old Peoples HOME WING, SAN FRANCISCO, CALIF. Ladies Protective & Relief Society, 3400 Laguna St. and The Old Peoples Home, 2507 Pine St., San Francisco, Calif. Bids June 15. CD **6/13**.

G. W. **Davis**, 2600 E. Lake Ave., Watsonville, Calif., CA **$546,800** (5 bidders) rehabilitate HIGH SCHOOL BLDG. and CAFETERIA BLDG., SANTA CRUZ, CALIF. Santa Cruz City High School Dist., c/o Supt., 133 Mission St., Santa Cruz, Calif. Bids June 11. CD 5/16.

(Continued on page 152)

This "OGRE" can ruin a hot underground piping system that is turned on and off!

Let's look beyond just the initial cost of installing an underground piping system!

Consider for a moment how this system, once installed, will react to the thermal shock of turning it *on* and *off* (and what system isn't turned *on* and *off* occasionally). Unless the system is inherently capable of withstanding the shock of *on* and *off* service . . . that's when the "Ogre of Corrosion" swiftly becomes a real threat . . . and it costs *you* money!

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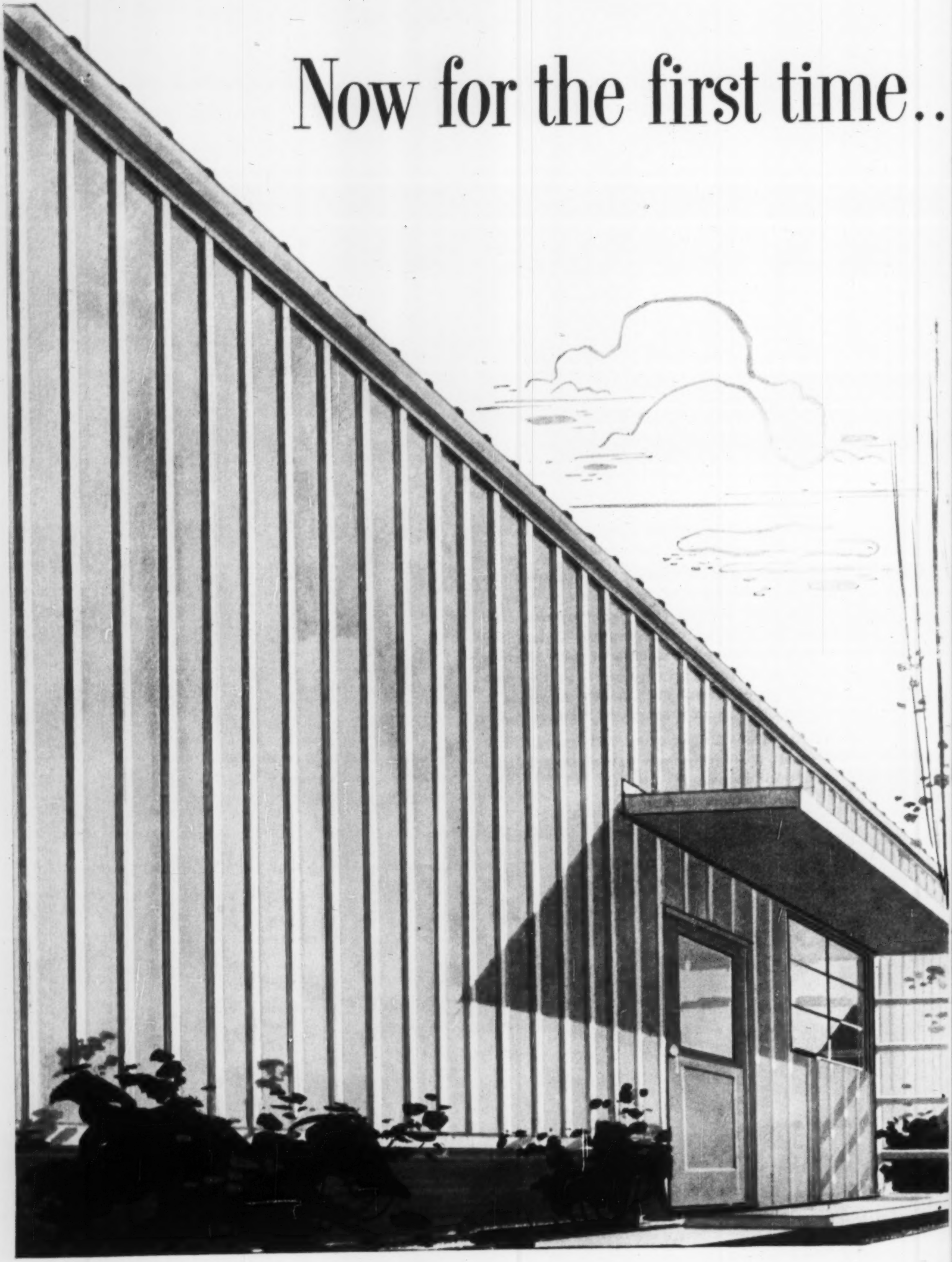

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The eye-appeal of far more expensive materials, plus the strength and low cost of steel! That's what you get in the new Stran-Steel Rigid Frame building line with exclusive *Stran-Satin* wall. *Stran-Satin*, a new satin-finish steel developed by National Steel, gives these buildings a beauty and attractiveness never before achieved in pre-engineered metal buildings.

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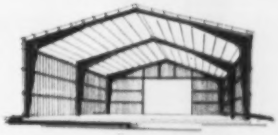
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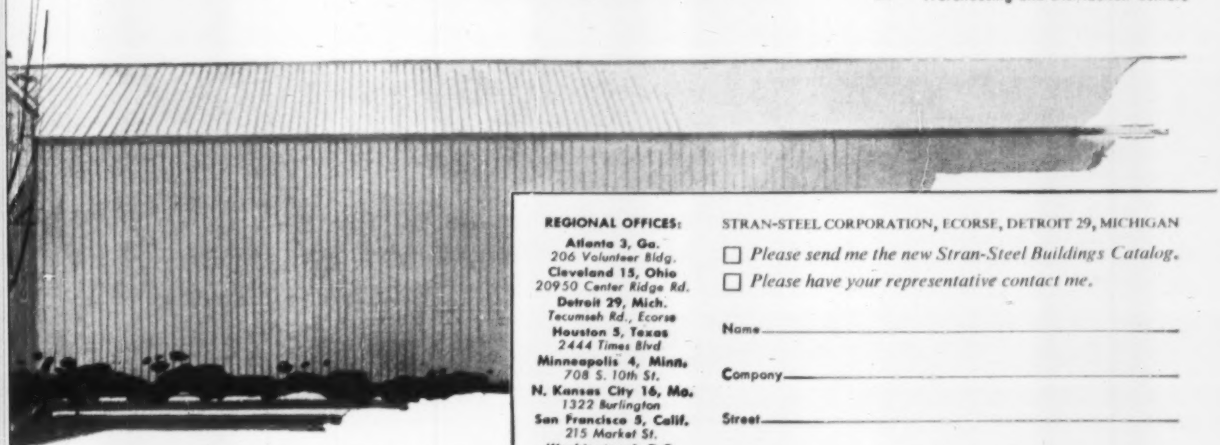

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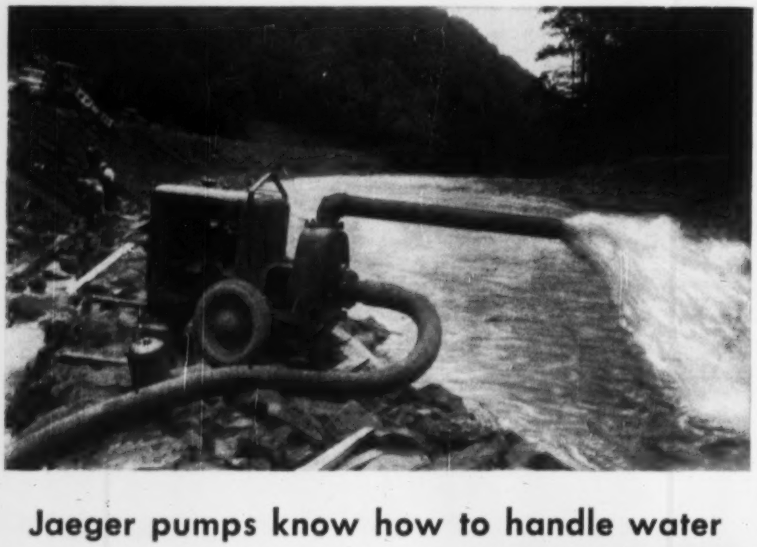

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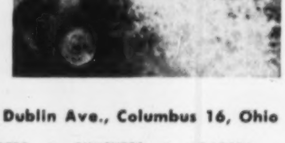

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CANADA

(Continued from page 150)

BUILDINGS—BA

Ont., Petawawa — SCHOOL, etc — BA 7/10 — Central Mortgage & Housing Corp., 40 Eglinton Ave. E., Toronto, school and gymnasium addn. at Army Camp. $600,000. Plans deposit $100. H. I. Stricker, c/o owner, engr. CD 4/16.

HEAVY CONSTRUCTION—LB & CA

BRITISH COLUMBIA—B. C. Govt., Parliament Bldgs., Victoria,

Peter Kiewit Sons Co. of Canada Ltd., 2182 W. 12 St., Vancouver, B. C. LB **$901,940**. Project 753, reconstr. 6.02 mi. Trans-Canada Rd. Twin Bridges-Lorenzetti Creek Section. Bids June 14.

MANITOBA—Manitoba Govt., Winnipeg.

Nelson River Constr. Ltd., 101 Dawson Rd., St. Boniface, Man. CA, **$867,756**. surf. 16.5 mi. Trans-Canada Highway from west crossing Assiniboine River near High Bluff to its junction with No. 4 highway. Awarded June 12. CD 6/4/51.

ONTARIO—Dpt. Hys., Parliament Bldgs., Toronto,

Johnson Bros. Co. Ltd., P.O. Box 1006, Brantford, Ont. CA **$798,126.** Contr. 56-67, grading, culverts, granular base, hot mix paving 7.6 mi. Hys. 5 and 24, Osborne Corners. Bids June 13, awarded June 15. CD 6/21, under LB.

▲ **ONTARIO**—Dpt. Hys., Parliament Bldgs., Toronto,

Hacquoil's, 1408 Brown St., Fort William, Ont. CA **$1,784,992**. Contr. 56-43, grading, culverts, granular base Hy. 17, Trans-Canada Hy. Rte. 11.8 mi. from 10 mi. east of Marathon, Marathon. Bids June 13. CD 6/20, under LB.

▲ **ONTARIO**—Dpt. Hys., Parliament Bldgs., Toronto,

Ont.—**Aiken & MacLachlan Ltd.**, P.O. Box 306, St. Catherines, Ont. LB **$119,924**. (4 bidders) Cont. 56-48, structure on intersection of Queen Elizabeth Hy. near Hamilton;

Ont.—**Bailey Constr. Co.**, 1977A Avenue Rd., Toronto, Ont. LB **$96,295**. (4 bidders) Contr. 56-42, structures, grading approaches, hot mix paving, Hamilton Dist., Windermere overpass, Hamilton;

Ont.—**R. A. Blyth**, 7 St. Andrews Gardens, Toronto, Ont. LB **$1,278,123** (2 bidders) Contr. 56-52, structures, Hy. 17, Moon River crossing, Huntsville; LB **$676,443**, Contr. 56-50, structure, Kenora Dist. Hy. 17 structures over Beaver Creek and Eagle River;

Ont.—**Hi-way Constr. Ltd.**, Box 187, Simcoe, Ont. LB **$563,598**. (4 bidders) structure, grading culverts, granular base, hot mix paving, Queen Elizabeth Hy. at Burlington Interchange, Hamilton;

Ont.—**Keillor Constr.**, 169 Woodworth Ave., St. Thomas, Ont. LB **$432,661**. (2 bidders) structure, grading, culverts, granular base, hot mix paving, Hy. 401, intersection at Hy. 73, Dorchester Twp. Bridge No. 8, St. Thomas.

▲ **United Waterways Constructors Ltd.**, c/o Angus Robertson Ltd., 5035 Western Ave., Montreal, Que. CA **$14,440,000**. Upper Beauharnois Lock and approaches Soulanges sect. St. Lawrence Seaway, near Montreal for St. Lawrence Seaway Auth., ONTARIO. St. Lawrence Seaway Auth., No. 2 Temporary Bldg., Wellington St., Ottawa, Ont. Bids June 12, awarded June 18. CD 6/20, under LB.

QUEBEC—Provincial P. Wks., Dpt., Parliament Bldgs. Quebec City, Que.

Norema Construction Ltd., 102 Sulpicien St., L'Epiphanie, Que., CA, Est. **$500,000**. rein.-con. bridge over Betsiamites River, Labrieville. Ivan E. Vallee, c/o owner, deputy minister. Awarded June 14.

▲ **Canadian Vickers Ltd.**, Maisonneuve, Montreal, Que., LB **$1,508,000**. operating machinery on 2 rolling lift type bridges, one at Cote Ste. Catherine Lock in Lachine Section, other at Iroquois Lock in International Rapids Section, Montreal, QUEBEC. St. Lawrence Seaway Authority, No. 2 Temporary Bldg., Ottawa, Ont. A. Gordon Murphy, c/o owner, 685 Cathcart St., Montreal, Que., ch. engr. CD 9/9/54, under Earthwork, Waterways;

Hamilton Bridge Div., Bridge & Tank Co. of Canada Ltd., 231 Bay St. N., Hamilton, Ont. LB **$810,000** (3 bidders) 2 rolling lift type bridges, one at Cote Ste. Catherine Lock in Lachine Section, other at Iroquois Lock in International Rapids Section (Quebec).

BUILDINGS—LB & CA

▲ **McDonald Constr. Co.**, 70-76 Sullivan St., Halifax, N. S., CA, **$1,000,000**. 4 story, T-shaped, 50x130 ft. steel, brick CHEMISTRY section and 50x100 ft. PHYSICS section bldg., ANTIGONISH, N. S. St. Francis Xavier University, Antigonish, N. S. Larson & Larson, Reynolds, N. C., U. S. A., archts. Awarded June 20. CD 6/6.

Dodge Constr. Co. Ltd., Bridge St., Cardinal, Ont. CA **$500,000** (7 bidders) HIGH SCHOOL, IROQUOIS, ONT. South Dundas Dist. High School Bd., Iroquois, Ont. Bids May 15. CD 4/30.

Milne & Nicholls Ltd., 57 Bloor St. W., Toronto, Ont., CA, **$950,000**. 1 story 220x240 ft., WAREHOUSE and OFFICE expansion, TORONTO, ONT. Alloy Metal Sales Ltd., 181 Felet St. E., Toronto, Ont. Bids June 8, awarded June 14. CD 6/4.

▲ **Anglin-Norcross Ontario, Ltd.**, 224 Davenport Rd., Toronto, Ont., CA **$10,000,000**. 17-story Royal York HOTEL ADDN., TORONTO, ONT. Canadian Pacific Ry. Co., N. M. Kelly, Ontario Dist. Engr., Union Station, Toronto 1, Ont. Awarded June 19. CD 3/1, under CA.

▲ **J. L. E. Price & Co. Ltd.**, 4664 St. Catharine St. W., Montreal, Que., CA Est. **$1,000,000**. 1 and 2 story 120,000 sq. ft. steel frame FACTORY, OFFICE, Dixie Rd. north of Queen Elizabeth Way, TORONTO, ONT. Eastern Power Devices, Ltd., 29 Wabash Ave., Toronto, Ont. Bids June 6, awarded June 19. CD 6/4.

▲ **Charles Duranceau Ltee.**, 2545 Jacques Hertel St., Montreal, Que., CA, **$3,000,000**. (2 bidders) PRINTING PLANT EXTEN. Fortification Lane, St. Lawrence

(Continued on page 155)

Cutting the New York State Thruway past Suffern, N. Y. required a 112-hole side hill shot only 100 ft. from houses. Using Atlas explosives and techniques, the 1,100 lb. blast was set off with few townspeople realizing it!

Carving the Schuylkill Expressway close to Philadelphia homes and factories brought the order, "hold down noise and vibration." The Atlas ROCKMASTER® millisecond delay pattern triggered an efficient, muffled blast—held the "good neighbor policy."

Blasting along Central Avenue with the eyes and ears of Yonkers upon you calls for Atlas millisecond delays in an alternate pattern. Results: excellent breakage with no loud air snap . . . no complaints.

when NOISE is the problem...

PROLONGED CONFINEMENT COUNTS

Atlas explosives and Atlas methods . . . *the right cost-cutting combination*

THE right combination of Atlas explosives and techniques provides *prolonged confinement* of explosive force—results in better throw control, improved breakage, minimum noise and vibration.

Before your next blast, why not talk over the specific problems with your Atlas representative. He'll help you get the best all 'round results. And write for "Better Blasting"—Atlas' informative newsletter on latest methods and materials.

EXPLOSIVES DEPARTMENT
ATLAS
POWDER COMPANY
WILMINGTON 99, DELAWARE
offices in principal cities

One Michigan replaces two crawlers and grader . . .

Clean-up costs threatened profits until Calif. contractor bought this 2¼ yd. Michigan

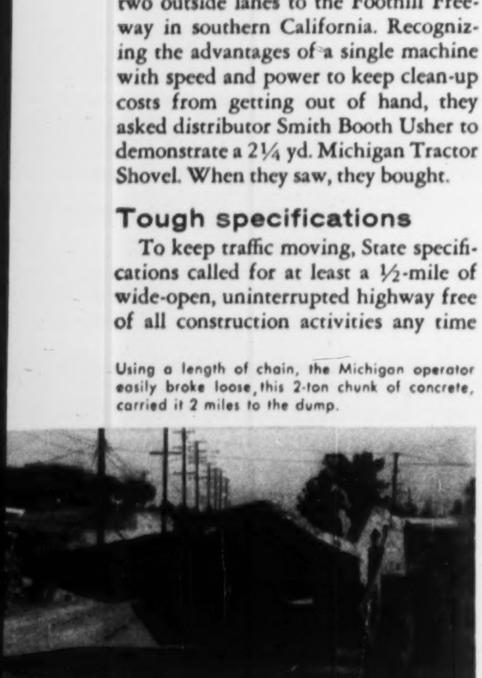
Due to the nature of the job specifications, excavating contractor Kirby-Erwood Co. (Van Nuys, Cal.) faced a substantial clean-up problem in adding two outside lanes to the Foothill Freeway in southern California. Recognizing the advantages of a single machine with speed and power to keep clean-up costs from getting out of hand, they asked distributor Smith Booth Usher to demonstrate a 2¼ yd. Michigan Tractor Shovel. When they saw, they bought.

Tough specifications

To keep traffic moving, State specifications called for at least a ½-mile of wide-open, uninterrupted highway free of all construction activities any time Kirby-Erwood switched work from one side of the highway to the other. Still, it was often necessary to work alternate sides of the highway because of timing as utilities were moved.

There was excess excavation as each section was temporarily and permanently completed—broken concrete from old structures and large boulders dug up by excavating equipment. To meet the specifications under these conditions, clean-up work had to be fast and highly productive.

Using a length of chain, the Michigan operator easily broke loose this 2-ton chunk of concrete, carried it 2 miles to the dump.



Michigan replaces crawlers

The 27-mph Michigan has replaced two crawler-loaders on clean-up. In many sections the Michigan does its own grading and scarifying of old bituminous shoulders, eliminates considerable grader work. The Michigan travels along a pavement at high speed, picks up boulders and cobbles which formerly had to be gathered and windrowed by a grader and loaded by the crawlers. In terms of economy, the Michigan operator *does the work of two crawler operators and much of the work of a grader operator.*

How to cut costs

Kirby-Erwood's Michigan does more than help them meet job specifications: it cuts many dollars of expense from this $612,000 freeway project. By handling clean-up work efficiently, the Michigan prevents this expense item from eating into job profits.

With Clark torque converter, power-shift transmission and planetary-wheel axles standard on all models, Michigans deliver more usable power, traction and speed than any machine of this type. If you're willing to be convinced that this machine is in a class by itself, do what Kirby-Erwood did; *ask for a demonstration.* You name the job!

Michigan is a registered trade mark of

CLARK EQUIPMENT COMPANY
Construction Machinery Division
2401 Pipestone Road
Benton Harbor 22, Michigan

CLARK®
EQUIPMENT

(Continued from page 152)

Blvd. and Craig St. W., MONTREAL, QUE. La Presse Publishing Co. Ltd., 7 St. James St. W., Montreal, Que. Awarded June 20. CD 2/15.

Montclair Constr. Co. Ltd., 5515 Western Ave., Montreal, Que., CA **$702,500**. Verdun HIGH SCHOOL addn., Argyle Ave., Verdun, MONTREAL, QUE. Protestant Bd. of School Trustees of City of Verdun, Verdun, Que. deBelle & White, 5925 Monkland Ave., Montreal, Que. archts. T. G. Anglin, 1010 St. Catherine St. W., Montreal, Que. engrs. Awarded June 19. CD 11/3/55, under LB.

U. S. POSSESSIONS

BUILDINGS—LB & CA

▲† **Caribbean Enterprises Corp.**, Box 6186, Loiza St. Station, Santurce, Puerto Rico, CA **$1,094,860**. Proj. No. 21, Frederiksted Elementary Junior HIGH SCHOOL, Kings Hill ELEMENTARY SCHOOL, ST. CROIX, VIRGIN ISLANDS. Dpt. Insular Affairs, Div. Procurement & Supply, Charlotte Amalie, St. Thomas, Virgin Islands. Bids Mar. 28. CD 4/4, under LB.

PROPOSED PROJECTS

WATER SUPPLY

▲ **Ill., Wilmette**—Village, filter plant, pumps and pipe line. **$2,000,000**. Alvord, Burdick & Howson, 20 N. Wacker Dr., Chicago, consult. engrs.

▲ **Mont., Bozeman**—City, voted **$1,500,000** bonds, water supply expansion. (Correction-location). CD 6/8, under Mo., Bozeman.

SEWERS, WASTE DISPOSAL

▲ **Calif., Santa Ana**—Orange Co., Court House, defeated **$42,620,000** bonds, flood control system. Harrison & Wooley, 308 W. 5 St., Santa Ana, consult. engrs. CD 4/3.

▲ **Conn., Glastonbury**—Town, sewerage sys. and disposal plant, **$1,700,000**. Buck & Buck, 650 Main St., Hartford, consult. engrs. CD 1/10/45.

▲ **Conn., New Britain**—City, City Hall, flood control and sewer imprv.,
Willow Brook—enlarge channel dam in south branch below Shuttle Meadow Ave.;
Piper Brook—conduit 2 mi. north to Fairview Cemetery;
Bass Brook—relocate west of Stanley St.;
general rehabilitation of storm sewers in Webster Brook, Quinnipiao River and other areas;
south trunk sewer from Glen St.;
sewage disposal plant; east trunk sewer; east side trunk sewer, expansion of Barbour Rd. trunk sewer, incl. 18 mi. sanitary sewers, 12 mi. sanitary sewers, 5 mi. major stream channel imprvs. and enlargement, **$11,000,000**. Chas. T. Main, Inc., 80 Federal St., Boston, Mass., consult. engr. Geo. J. Molleur, city engr. To go ahead in the Fall.

▲ **Conn., New Milford**—Town, Town Hall, sewage sys. and treatment plant, Bridge St. connection to 800 outlets, **$1,250,000**.

▲ **Ind., Indianapolis**—Bd. Sanitary Comrs., 421 N. Pennsylvania St., storm sewers, North Keystone storm sewer sys., 60-acre site from 52nd to Kessler, between Keystone and Monon R.R. **$1,000,000**. **Moore & Heger**, 810 N. New Jersey St., consult. engrs.

▲ **Ky., Owensboro**—City, City Hall, sewage treatment plant, intercepting sewer, primary settling tanks, digestors, filters, concrete sewers up to 24-in., rein.-con. 24- to 42-in., **$2,450,000**. Consoer, Townsend & Assoc., 351 E. Ohio St., Chicago, Ill., consult. engrs. for treatment plant; Johnson, Depp & Quisenberry, 915 Frederica St., Owensboro, engrs. for sewers and site direction. To go ahead in Aug. CD 5/31.

BRIDGES

▲ **Ind., Gary**—Bd. Comrs., Lake Co., County Court House, Crown Point, Cline Ave. overpass between Fifth and Ninth Aves., **$1,500,000**. Consoer Townsend & Assoc., 360 E. Grand Ave., Chicago, Ill., consult. engrs.

STREETS AND ROADS

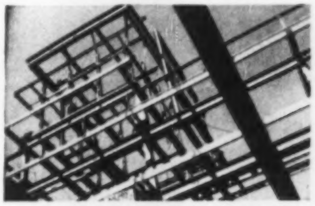
▲ **FLORIDA**—Florida State Turnpike Auth., Box 1180, Fort Lauderdale,
northern extension of Sunshine State Parkway from Fort Pierce to Tisonia north of Jacksonville, Est. **$155,400,000**. Howard, Needles, Tammen & Bergendoff, 55 Liberty St., New York, N. Y., consult, engrs. with C. H. Peterson, project engr.
Section engineers for the Northern Extension are as follows:
Sections 7 and 10, Bail, Horton & Associates, Walcaid Bldg., Bradenton, Fla.
Section 8, Capitol Eng. Corp., Dillsburg, Pa.
Section 9, Marion-Carter Inc., 1530 20 St., Vero Beach, Fla.
Section 11, Brown & Blauvelt, 468 4 Ave., New York, N. Y.
Section 12, Glace Eng. Corp., 153 Treasure Island Causeway, Treasure Island, Fla.
Section 13, Ewin Eng. Corp., P. O. Box 361, Mobile 3, Ala.
Section 14, Sherlock, Smith & Adams, 303 Washington Ave., Montgomery, Ala.
Setcion 15, Hazelet & Erdal, Commerce Bldg., Louisville, Ky.
Section 16, Michael Baker, Jr., Inc., Baker Bldg., Rochester, Pa.
Section 17, Henry Balke Engineers & Rochester & Goodell Engineers, Inc., 2330 Victory Parkway, Cincinnati 6, O.

(Continued on page 157)

MODERN STRUCTURES

NEED
MODERN
METHODS

Lamson
HIGH-STRENGTH
STRUCTURAL
STEEL BOLTS



400 tons of structural steel completely assembled with approximately 82,000 High-Strength Bolts—Diameters ⅝" thru 1".

And here's the result . . . a modern, safe structure, assembled quickly, less expensively and QUIETLY.

● Lamson High-Strength Bolts are the answer to today's need for construction speed and economy as well as tomorrow's requirements for strength and safety.

Once properly installed, High-Strength Bolts CANNOT be matched for strength or low inspection and maintenance costs.

Compared to old-fashioned riveting, High-Strength Bolts are stronger statically, higher in fatigue resistance and have far greater shear strength.

In the photographs to the left you see the new airport terminal at Cleveland's Hopkins airport . . . completely assembled with Lamson High-Strength Structural Steel Bolts . . . another safe, modern structure . . . designed for tomorrow—today.

Write for the COMPLETE High-Strength Bolt story. This 8-page brochure is yours for the asking without obligation.

The **LAMSON & SESSIONS** *Co.*
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Plants at Cleveland and Kent, Ohio
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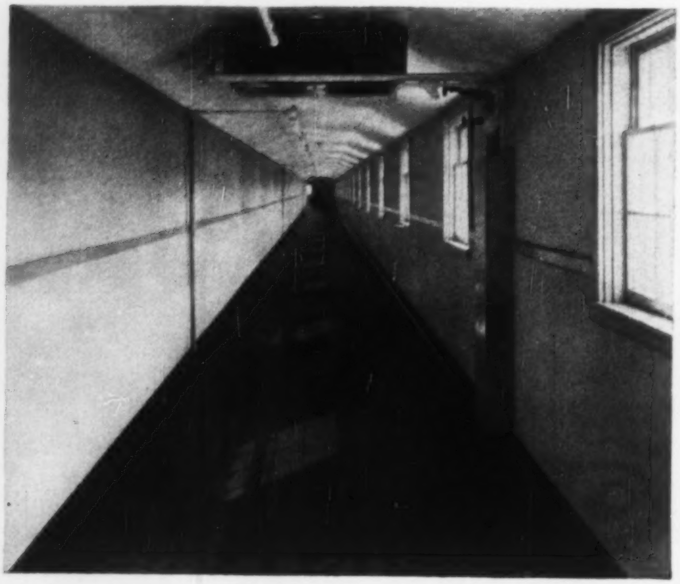
Lamson + Sessions

Large Bolts • Cotters
Square and Hex Nuts • Weather-tight Bolts • Bent Bolts
Phillips and Clutch Head Screws • Lock Nuts • Cap Screws

WHERE CLEANLINESS

SAFETY and

ECONOMY COUNT...



Hospital corridors must be easy to clean and safe from fire. The answer here is wainscoting of K&M Apac.

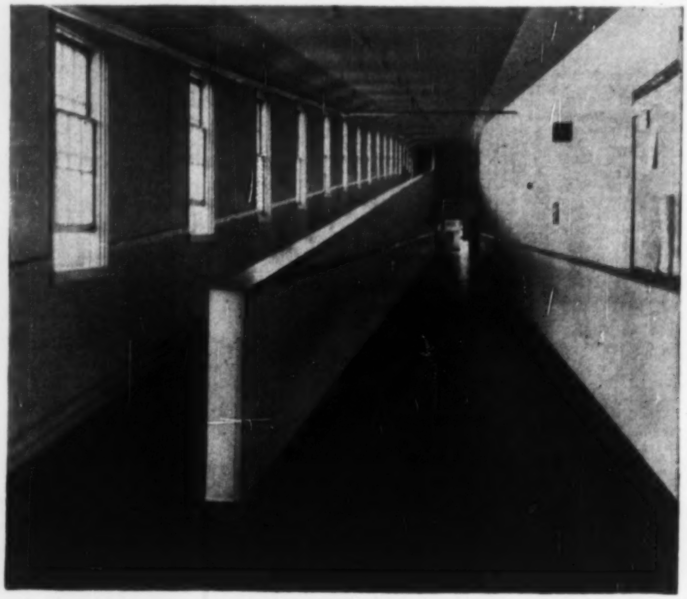
K&M "APAC" ASBESTOS SHEETS

These two illustrations show but one of many excellent uses for this material . . . use K&M Apac almost anywhere . . . as interior and exterior siding, office paneling, plant and office ceilings, machine shop sheathing, stock room sidewalls, basement partitions, linings for elevator casings; as inside-plant enclosures, as waste and storage bins, and even as hoppers.

K&M Apac is the ideal low-cost, long-life building material. It is made of two practically indestructible ingredients . . . asbestos fiber and portland cement . . . and actually grows harder and more durable with age. K&M Apac cannot burn, rot or corrode, nor can it be damaged by vermin or rodents. Apac is easily sanitized with soap and water.

PRACTICALLY NO MAINTENANCE NEEDED, indoors or out! K&M Apac sheets are highly weather-resistant. Their natural gray color is attractive and no painting is required for protection.

INEXPENSIVE APPLICATION is possible with K&M Apac . . . large 4′ x 8′ sheets can be applied on a big area quickly, and even unskilled labor can cut, drill or shape them on the job without special equipment.



K&M Apac is ideal for this ramp-wall which must be rugged to withstand the continuous scuffing and scraping of heavy traffic.

KEASBEY & MATTISON
COMPANY • AMBLER • PENNSYLVANIA

K&M best in asbestos

(Continued from page 155)

Section 18, Tecon Engineers, Inc., 314 Wilkinson St., Frankfort, Ky.

Section 19, DeLeuw, Cather & Brill, 202 E. 44 St., New York 17, N. Y.

Section 20, Palmer & Baker Inc., P. O. Box 346, Mobile, Ala.

Section 21, Gannett Fleming Corrdry & Carpenter, P. O. Box 1155, Delray Beach, Fla.

Section 22, E. Lionel Pavlo, 7 E. 47 St., New York, N. Y.

Section 23, Beiswenger, Hoch & Assocs., Prudential Bldg., Jacksonville, Fla.

Section 24, Reynolds, Smith & Hills, P. O. Box 4817, Jacksonville, Fla.

Section 25, Smith & Gillespie, P. O. Box 1048, Jacksonville, Fla. CD 1/13.

▲ **Tex., Orange**—Orange Co., Court House, county road building project. Precinct Nos. 1, 2, 3, and 4. **$1,000,000** each. Lockwood, Andrews & Newman Engrg. Co., Union Natl. Bank Bldg., Houston, consult. engr. CD 8/26.

AMERICANS ABROAD

▲ **Netherlands West Indies**—PLANT—Govt. of Netherlands West Indies, Aruba, plant for converting 2.7 mg.d. of seawater into fresh water and 20,000 kw. power plant. **$10,000,000.** Singmaster & Breyer, 420 Lexington Ave., New York, N. Y., U.S.A., consult. engrs. CD 5/3, under Foreign.

FOREIGN

▲ **Netherlands, Rotterdam**—REFINERY—Esso Nederland N.V., The Hague (affiliate Standard Oil of New Jersey, 15 W. 51 St., New York, N. Y. U.S.A.), 30,000-40,000 bbl. refinery near here. **$29,000,000.** To start 1957.

PUBLIC BUILDINGS

▲ **Calif., Bellflower** — SCHOOLS — Bellflower Unified School Dist., Bellflower voted **$4,000,000** bonds election June 1, schools.

▲ **Calif., Eureka**—SCHOOL—Eureka City Elementary & City High School Dist., 1915 "J" St., Eureka, plans by Wm. Van Fleet, 350 "E" St., Eureka and Masten & Hurd, 526 Powell St., San Francisco, junior high school. **$1,300,000.** CD 10/19.

▲ **Calif., Los Angeles**—SCHOOL—Los Angeles Bd. of Educ., 1425 S. San Pedro St., plans by Stanton & Stockwell, 267 S. Carondelet St., Los Angeles, Southeast Valley area High School, **$4,000,000.** CD 4/8/55.

▲ **Calif., Selma**—SCHOOL—Selma Union High School Dist., c/o supt., 2446 N. McCall Ave., plans by Walter Wagner & Partners, 1830 Van Ness Ave., Fresno, high school, **$1,712,396.** CD 6/17/55.

▲ **Conn., New Haven**—HOUSING—State P. Wks. Dpt., 165 Capitol Ave., Hartford, plans by Pedersen & Tileny, 111 Whitney Ave., New Haven, moderate rental housing incl. 300 units, **$2,420,000.** P. J. Carroll, c/o owner, engr.

▲ **Conn., New Haven**—SCHOOLS—Town, plans by Schilling & Goldbecker, 18 Trumbull St., East High School, Mitchell Dr.; West High School, **$5,000,000.** Henry A. Pfisterer, 11 Whitney Ave., consult. engr. Milton T. Corbet, 18 Trumbull St., engr. CD 3/9.

▲ **Conn., Waterbury**—HOUSING—State P. Wks. Dpt., 165 Capitol Ave., Hartford, plans by Louis R. Fucito, 141 S. Elm St., Waterbury, moderate rental housing. **$2,420,000.** P. J. Carroll, c/o owner, engr. CD 6/12.

▲ **Fla., Tallahassee**—DORMITORIES—State Bd. Control, Florida State University, Tallahassee, plans by Guy C. Fulton, Bd. of Control, University of Florida, Gainesville, two dormitories for State University, **$2,300,000.** CD 6/12.

▲ **Idaho, Meridian**—SCHOOL—Meridian School Dist. No. 2, Ada and Canyon Counties, Meridian, defeated bonds June 7, five grade schools, high school and junior high school addn. **$1,450,000.** CD 5/24.

▲ **Ill., Franklin Park**—HIGH SCHOOL—School Dist. 12, Franklin Park, plans by Sobel & Stein, 450 E. Ohio St., Chicago, West Leyden Twp. High School near Grand Ave. and Wolf Rd. **$6,000,000.**

▲ **Mich., Highland Park**—HOSPITAL—City, City Council, 30 Gerald St., Zone 3, voted **$1,700,000** bonds June 12, Highland Park General Hospital. Smith Tarapata, MacMahon, Inc., 894 S. Adams Rd., Birmingham, archt. CD 2/21.

▲ **Mich., Redford**—SCHOOL—Twp., Redford Union School Dist., 26440 Puritan, Detroit, Zone 23, plans by Earl G. Mayer 806 Farwell Bldg., Detroit 26, elementary junior high, **Wayne Co. $2,500,000.**

▲ **Mo., Webster Groves (St. Louis 19 P.O.)**—HOUSING—St. Louis County Housing Auth., Robert J. Tracy, exec. dir., 1316 Sherman Dr., Lemay, Zone 23, plans by Leo A. Daly Co., 411 N. 7 St., St. Louis, Zone 1, 140 public housing units on 10 acre tract bounded by Allison and Thorton Aves. and rear of property fronting on Bell and Ennis Aves., north of city limits. **$2,020,000.** CD 6/29/50.

▲ **Neb., Omaha**—BUILDING ADDN.—University of Nebraska, 12 and R Sts., Lincoln, plans by John Latenser & Sons, 1307 Farnam St., University of Nebraska Medical College at Omaha addn. **$4,500,000.** CD 10/24/52.

▲ N. J., **Belmar**—SCHOOL—Bd. Educ., Wall Twp., Belmar, plans by Micklewright & Mountford, E. Stuyvesant Ave., Trenton, school, west of Rte. 35, Manasquan Circle and Atlantic Ave., Wall Twp. **$2,100.000.**

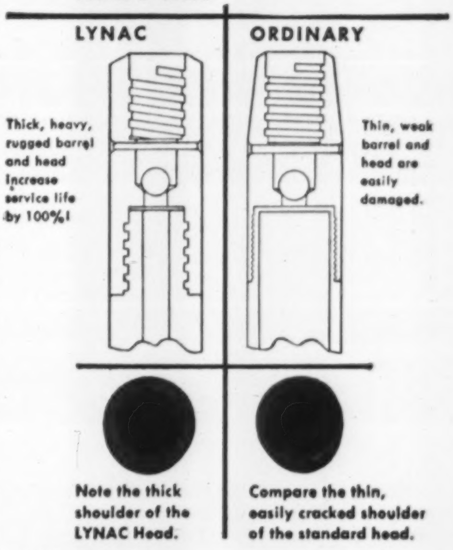
▲ N. J. **Bordentown**—HEALTH TRAINING CENTER—State, Dpt. P. Health, Institutions and Agencies, State House, Trenton, conversion of Bordentown Industrial Training School into a Mental Health Training Center, **$1,500,000-$2,250,000.**

(Continued on page 161)

new acker Lynac* split tube sampler

increases service life 100%

HERE'S WHY


LYNAC
ORDINARY
Thick, heavy, rugged barrel and head increase service life by 100%!
Thin, weak barrel and head are easily damaged.
Note the thick shoulder of the LYNAC Head.
Compare the thin, easily cracked shoulder of the standard head.

Acker engineers have done it again! By improving the design and construction of the standard split tube samplers, Acker engineers increased the service life of their new LYNAC Sampler by over 100%!

Look over the drawings at the left and you'll see why. Then, write for literature describing Acker's new LYNAC Sampler.

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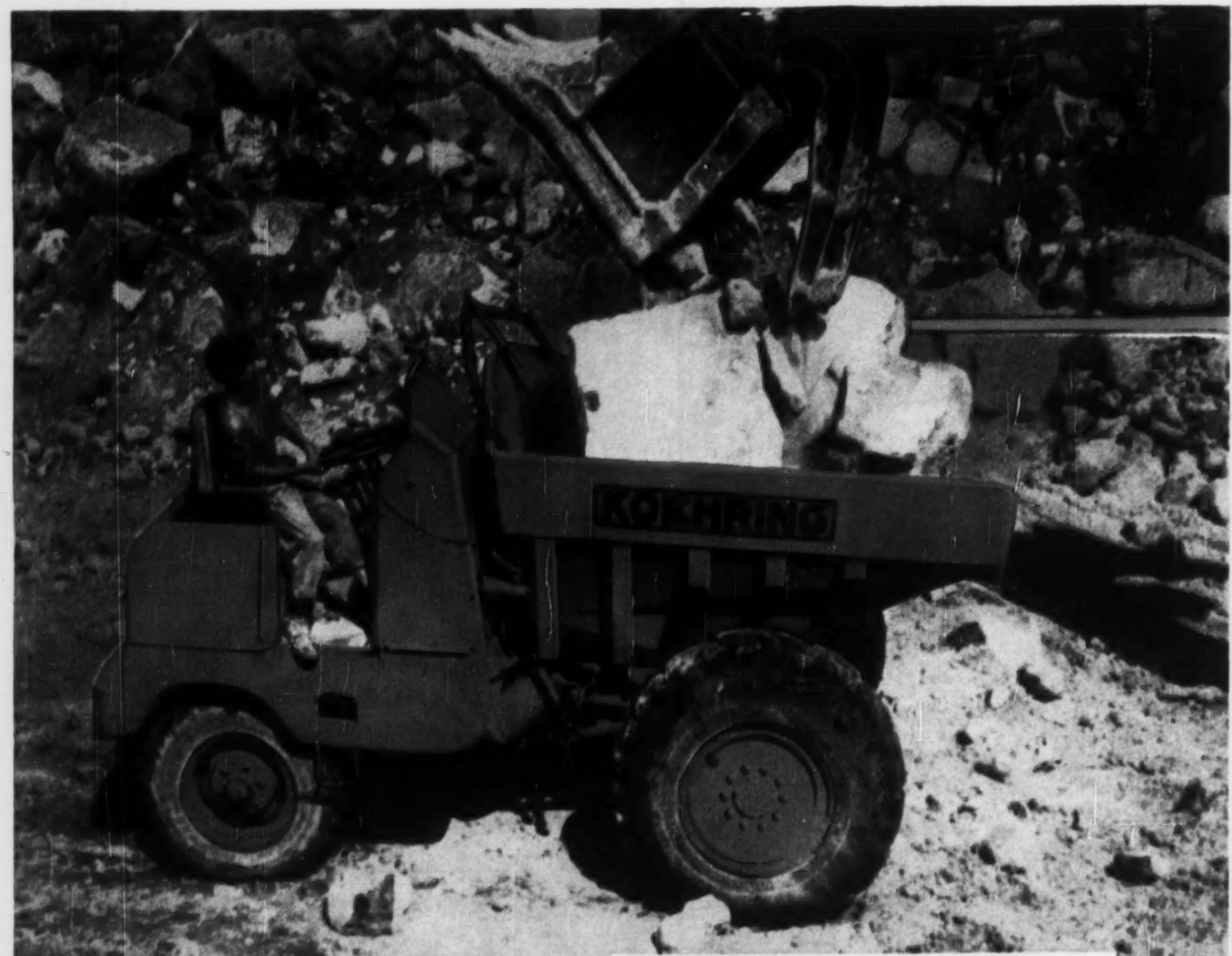
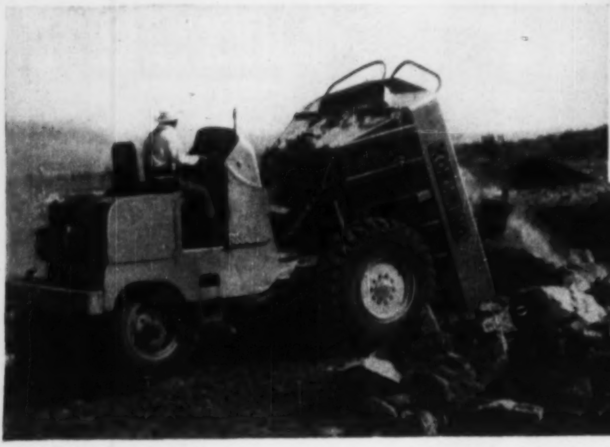


Shovel-loading big-chunk rock into Dumptor — square body opening provides 64 square feet of target for easy loading over the side, or either end. It's the heavy-duty hauling unit with a ton of strength for every ton of payload capacity!

Plenty of power on the haul — (check high ratio of H.P.-to-loaded-weight in Dumptor story on next page). Dumptor also travels at same speeds in either direction for fast, no-turn shuttle hauling.



One-second gravity-dump speeds haul cycles. Dumptor has no troublesome body hoist, no hoist maintenance. Gravity-dump never balks, and never wears out.

IN ROCK LIKE THIS

you need Dumptors

When you are loading 1½ to 2½ yards of rock at a single pass, hauling units need plenty of strength to last. With Koehring heavy-duty Dumptor, there's a ton of strength for every ton of payload capacity. *It's built for rock.* Sides and ends of all-welded 6-yard body are heavily rib-reinforced. Double-plate bottom, lined with multiple steel beams, cushions the shocks of rock loading. Bolted or free-swinging kick-out pan adds another ½" steel plate to Dumptor bottom for extra strength.

There's plenty of strength, too, in the heavily-trussed chassis to take constant pounding of heavy loading and rough, off-road hauling. What's more, Dumptor has no leaf springs — just one big snubber-type chassis spring on the steering axle — none on the drive axle. Big drive tires eliminate the need for more springs, absorb loading and hauling shocks — save spring maintenance.

Even with all this heavy-duty strength, Koehring Dumptor® still has more than 6 H.P. for every ton of loaded weight. It accelerates fast, pulls through soft ground with less shifting, climbs 24% grades fully loaded. If you have a tough hauling problem, see your Koehring distributor about this heavy-duty 6-yard Dumptor. Why not call him now?

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16
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Johnson 50 to 125-yd. Roadbuilders plants

Flexible All-Welded Roadbuilders Bin gives you a portable batch plant for 2, 3 or 4 aggregates, or converts to transit-mix (shown) or central-mix plant for bulk cement and 2 or 3 aggregates. Can be equipped with 1 or 2 multiple material Hi-Speed Batchers, size 34 Roadbuilders Batcher, or truck-mixer charging batcher in 2 to 5 cu. yd. sizes. Bin available with 2, 3 or 4 compartments, 50 to 125 cu. yds. Also: silos, elevators, buckets.

C. S. JOHNSON • Champaign, Ill.
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7-second discharge with Kwik-Mix 11-S

Saving important seconds on every batch of concrete, tilted Flow-Line Discharge Chute pours full 12.1 cu. ft. batch in 7 seconds. Kwik-Mix 11-S Dandie® also has side or end discharge, 2 or 4 wheels, and special tower attachment. Other sizes: 3½-S to 16-S. Also check Kwik-Mix bituminous, tilt and non-tilt plaster-mortar mixers . . . and Moto-Bug® (power wheelbarrow) shown here. Ask your Kwik-Mix distributor for all facts.

KWIK-MIX • Milwaukee, Wis.
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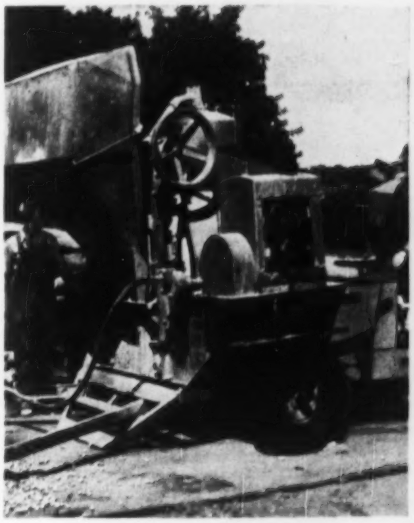

25 feet per minute with 150 Trenchliner®

On drainage, irrigation and utility trenching, 150 wheel-type Trenchliner digs 16 to 26 inches wide, at depths to 5¾ feet. Hydraulic wheel-hoist maintains close grade tolerance. 30 digging feeds range from 12 inches to 25 feet per minute. Has square or round-bottom buckets; gumbo lips or "Tap-In" teeth; 16 or 12-inch crawlers; gas or diesel power. Tile box and chute optional. Parsons line includes 5 other models, all sizes and types.

PARSONS • Newton, Iowa
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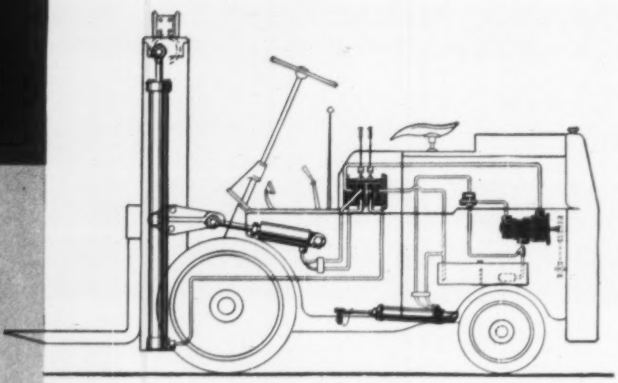
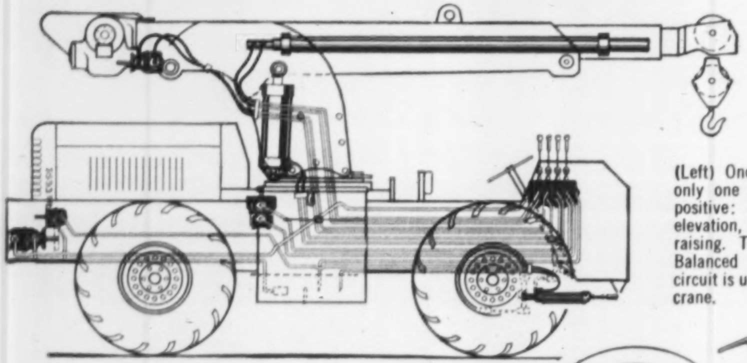
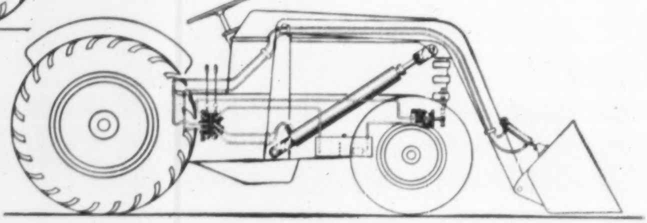


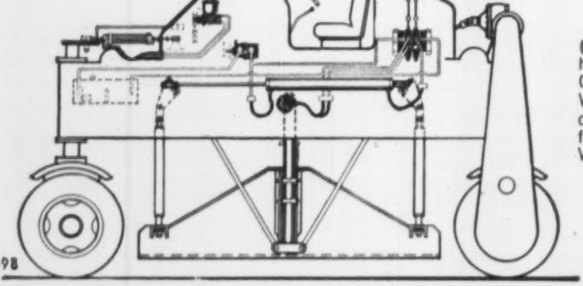
(Above) Fast tilting and lifting are possible along with exclusive "feathering" ability. Also, fingertip power steering permits operator to maneuver vehicle with one hand and control loading operations with the other. Additional vehicle attachments can be hydraulically controlled by simply adding sections to existing control valve eliminating necessity of mounting separate valves.



(Left) One Vickers Hydraulic System (using only one pump) provides fast, smooth and positive: (1) turntable rotation, (2) boom elevation, (3) boom extension, and (4) load raising. Turntable is driven by a Vickers Balanced Vane Type Fluid Motor. Another circuit is used for power steering this hydraulic crane.



(Right) Fast, easy and dependable operation of front end loader depends upon Vickers Balanced Vane Pump and Vickers Two-Section Directional Control Valve. Automatic wear compensation is inherent in all Vickers Balanced Vane Type Pumps. Note simplicity of installation.



7498

(Left) Straddle carrier uses hydraulic power to handle the load with precision and speed. Compact, two-section Vickers Multiple Unit Valve has double-acting valve for opening and closing load hooks and single-acting section for raising load. Separate circuit provides Vickers Hydraulic Power Steering.

WRITE FOR BULLETIN M5101A

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IN CANADA: Vickers-Sperry of Canada, Ltd., Toronto

ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

(Continued from page 157)

▲ **N. J., Frenchtown**—SCHOOL—Delaware Valley Regional High School Dist., high school for Frenchtown, Milford and Twps. of Alexandria, Holland and Kingwood, **$1,200,000.**

▲ **N. J., Manahawken**—SCHOOL—Long Beach Island School Bd., c/o Mrs. Ethel Jacobsen, Barnegat Light, voted bonds May 31, regional junior-senior high school. **$1,200,000**. CD 5/2.

▲ **N. J., Mountain Lakes**—HIGH SCHOOL ADDN.—Bd. Educ., Borough of Mountain Lakes, plans by Epple & Seaman, 901 Broad St., Newark, high school addn. **$1,161,000.** CD 6/30/55.

▲ **N. J., Passaic**—HOUSING—Passaic Housing Auth., Passaic, plans by Barnett A. Singer, 15 Benmore Terrace, Bayonne, 214 unit housing proj. Chestnut St. between Main and Myrtle Aves. **$2,500,000.** CD 9/2/49.

▲ **N. J., Paterson**—HOUSING—Paterson Housing Auth., Paterson, plans by Kelly & Gruzen, 80 Fifth Ave., New York, N. Y., public houses, Lane and Matlack Sts. **$5,500,000.** Bids end of June.

▲ **N. J., Trenton**—HOUSING—Trenton Housing Auth., City Hall, plans by Micklewright & Mountford, E. Stuyvesant Ave., Trenton and Daniel Pulone, 247 Hamilton Ave., Zone 9, 160 unit low cost housing **$2,500,000.** CD 9/15/54.

▲ **N. Y., Randolph**—SCHOOL—Randolph Central School voted **$1,350,000** bonds, elementary schools. CD 5/9.

▲ **N. C., Raleigh**—DORMITORY—North Carolina State College, Raleigh, plans by Leslie N. Boney, 120 S. 5 St., Wilmington, dormitory. **$2,000,000.** CD 6/7.

▲ **N. D., Fargo**—CIVIC CENTER—City, City Hall, voted **$1,725,000** bonds May 15, civic center. Kurke Assocs., 1117 13th Ave N., archts. CD 5/25.

▲ **O., Columbus**—ENGINEERING CLASSROOM, etc.—Ohio State University, N. High St., plans by Bellman, Gillett & Richards, 518 Jefferson St., Toledo, college of engineering classroom and office facilities. **$2,500,000.**

▲ **O., Columbus**—COLLEGE OF LAW—Ohio State University, N. High St., plans by Potter-Tyler-Martin & Roth, 128 E. 6 St., Cincinnati, completion of college of law bldg. **$1,500,000.**

▲ **O., Columbus**—HOSPITAL WING—Ohio State University, N. High St., plans by Garfield, Harris, Robinson & Schafer, 1740 E. 12 St., Cleveland, north wing for University Hospital. **$3,000,000.** Bids after October 1956. CD 5/4.

▲ **O., Columbus**—ARPS HALL ADDN.—Ohio State University, N. High St., plans by Sims, Cornelius & Schooley, 2901 N. High St., Arps Hall Addn., **$1,500,000.**

▲ **O., Dayton**—PLANT—City, Herbert W. Starick, city mgr., Municipal Bldg., lime recovery plant, incl. building and kiln, near softening plant, Ottawa St. **$1,479,692.** Bids in July. Black & Assocs., 700 S.E. 3 St., Gainsville, Fla., consult. engrs.

▲ **O., Lakewood**—CITY HALL—City, 14532 Lake Ave., Zone 7, plans by Garfield, Harris, Robinson & Schafer, 1740 E. 12 St., Cleveland, Zone 14, City Hall. **$1,000,000.** CD 11/11.

▲ **O., Mentor**—HIGH SCHOOL—Bd. Educ., Dale E. Rice, supt., Mentor Ave., bond election November 6, high school addn. **$1,000,000.** If passed new bids on high school will be taken. Fulton, Krinsky & Dela Motte, 6014 Euclid Ave., Cleveland, Zone 3, archts. CD 6/11, under LB.

▲ **Pa., Monroeville**—SCHOOL—Monroeville Pitcairn Joint School Dist., Monroeville, plans by Walter Schardt, 6101 Penn Ave., Pittsburgh, 1 and 2 story, masonry 150,000 sq. ft. senior high school and football stadium, **$3,500,000.** CD 10/9/52.

▲ **Tex., Austin**—SCHOOLS—Austin Independent School Dist., 701 E. 11 St., plans by Page, Southerland & Page, 602 West Ave., junior high school, near Hy. 290 and Prather Lane. **$1,000,000.** Plans by Lundgren & Maurer, 1007 W. 24 St. Junior high school, Windsor Park area. **$1,250,000.** CD 4/12/54.

▲ **Tex., Big Spring**—HOUSING—Big Spring Housing Auth., Big Spring, plans by John W. Floore, 1401 W. Lancaster St., Fort Worth, 460 unit housing proj. **$6,500,000.**

▲ **Wash., Everett**—HIGH SCHOOL—School Dist. No. 2, Everett, plans by W. A. Johnson & Assocs., 3506 Broadway, junior high school. **$1,500,000.** Bids this year. CD 11/15.

▲ **Ont., Cornwall**—HOSPITAL EXTENSION—Cornwall General Hospital, A. Dover, pres., Bd. Governors, Cornwall, plans by Comber, Comber & Mack, 120 Sydney St., Cornwall, hospital, exten. **$2,200,000.** CD 6/8.

▲ **Ont., North Bay**—COLLEGIATE—North Bay Collegiate Bd., R. F. Donnelly, chmn., North Bay, plans by Weir, Cripps & Assocs., 326 McIntyre St. W., collegiate on present Chippaua Barracks site. **$1,064,250.**

▲ **Que., L'Annonciation**—HOSPITAL—Hospital Des Laurentides and Que. Health Dpt., Quebec City, plans by P. Rinfret, 1132 Chemin St. Louis, Sillery, 400-500 bed mental hospital. **$5,000,000.** CD 6/4.

▲ **Sask, Moose Jaw**—HOUSING—Central Mortgage & Housing Corp., 400 Kensington Bldg., Winnipeg, Man., 255 houses with services. **$3,600,000.** H. J. Petursson, c/o owner, consult. engr. CD 9/27/51.

COMMERCIAL BUILDINGS

▲ **Calif., Los Angeles**—DORMITORIES—University of Southern California, Los Angeles, plans by Stanton & Stockwell, 627 S. Carondelet St., Los Angeles, men's dormitory; plans by Albert C. Martin & Assocs., 333 S. Beaudry St., Los Angeles, women's dormitory. **$2,000,000.** CD 5/24.

▲ **Conn., Bloomfield**—SHOPPING CENTER—Green Manor Estates, Inc., 681 Parker St., Manchester, plans by Samuel Grody, 137 Ridgefield St., Hartford, regional shopping center, Blue Hills and Wintonbury Aves., 41-

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-24"	16.00	14.50
-36"	24.00	22.50
¾"x1¾"-12"	6.15	5.60
-15"	6.60	6.00
-18"	7.50	6.50
-24"	11.00	10.00
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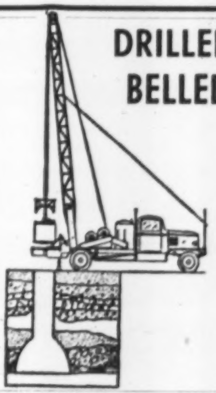

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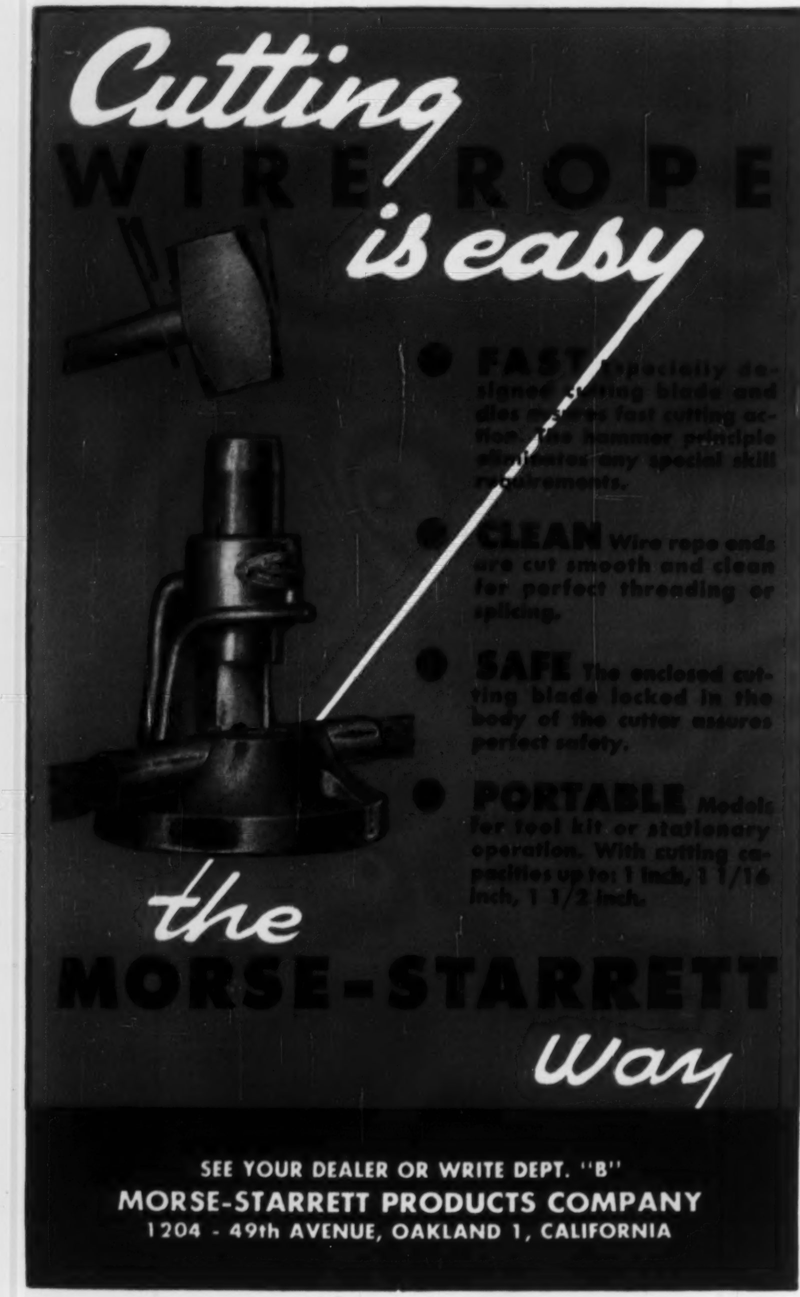

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acre site. 150,000 sq. ft. parking area. **$2,500,000**. CD 5/8.

▲ **Conn., Bridgeport**—OFFICE—Southern New England Telephone Co., 227 Church St., New Haven, plans by Harold H. Davis, 29 Whitney Ave., New Haven, 7 story office, **$3,000,000**, Hubbard, Lawless & Blakely, 110 Whitney Ave., New Haven, consult. engrs. Henry A. Pfisterer, 111 Whitney Ave., New Haven, engr. CD 5/2.

▲ **Conn., West Hartford**—HOUSING—Samuel H. Aron, 36 Pearl St., Hartford, 69-house development, Golf Estates, Belknap Rd., **$2,760,000**.

▲ **Conn., West Hartford**—HOUSING—Glenwood Homes, Inc., 750 Main St., Hartford, 77 house development, Glendale, Fuller Dr. **$1,540,000**.

▲ **Conn., West Hartford**—SHOPPING CENTER—Green Manor Estates Inc., 681 Parker St., Manchester, shopping center Corbin's Corner, **$1,700,000**.

▲ **Ill., Chicago**—OFFICE—Kiwanis International, 520 N. Michigan Ave., Zone 11, reconstr. private home into office, Rush and Erie Sts., **$1,000,000**.

▲ **Ill., Chicago**—STORES, RESTAURANT, etc.—Owner c/o American National Bank & Trust Co., 33 N. LaSalle St., plans by Pruyn & Bryant, 322 W. Washington St., stores, restaurant and parking garage, 24-32 S. Clark St. **$1,750,000**. Robert E. Hattis, 223 W. Jackson Blvd., consult. engrs

▲ **Ill, Chicago**—APARTMENTS—Owner c/o Hausner & Macsai, archts., 104 S. Michigan Ave., Zone 3, two 30 story apartments, total of 472 apartments, Lake front between Columbia and Pratt Sts. **$10,000,000**.

▲ **Ill., Elgin**—OFFICE—Brethren Publishing House, 24 S. State St., plans by Frazier & Raftery, 315 James St., Geneva, office bldg. and publishing house, Dundee Ave. adjacent Trout Park, **$1,500,000**.

▲ **Ill., Glenview**—SHOPPING CENTER—Milwaukee-Golf Development Corp., 2342 S. Grove St., Evanston, plans Kenneth L. Rowe, c/o Hawthorne Melody Farms, Milwaukee Ave., Libertyville, shopping center, Milwaukee Ave. & Golf Rd. **$3,000,000**.

▲ **Ill., Highland Park**—HOSPITAL ADDN.—Highland Park Hospital, Highland Park, plans by Charles & Smith, 20 N. Wacker Dr., Chicago Zone 6, hospital addn. **$1,500,000**.

▲ **Iowa, Cedar Rapids**—CATHOLIC HIGH SCHOOL—Catholic Deaneary of Cedar Rapids, c/o Rt. Rev. msgr. William H. Schulte, Dean, and Pastor, Immaculate Conception Parish, 857 3 Ave. S. E., Cedar Rapids, plans by Brown & Healey, 211-215 Higley Bldg., Cedar Rapids, 600-student Catholic High School K Ave. and Prairie Dr., **$1,250,000**. CD 10/5.

▲ **Mo., Kansas City**—COMMUNITY CENTER—Jewish Community Center, Harry Strauss, pres., Linwood and Wayne Sts., plans by Manuel Morris, Railway Exchange Bldg., Kansas City, Mo., Jewish Community Center, 82 and 83 Sts. and Holmes to Troost Sts., **$1,000,000**.

▲ **Mo., Kansas City**—PUBLISHING HOUSE—Nazarene Publishing House, 21 E. 57 St., plans by Kenneth Van Achen & Assoc., 1200 W. 39 St., Kansas City, Mo., rein.-con., Nazarene Publishing House, southeast 63 and Paseo Sts., 240 ft. on Paseo St., 260 ft. along 63 St., **$1,600,000**.

▲ **Mo., St. Louis**—MEDICAL BLDG.—St. Luke's Hospital Medical Bldg., c/o Eugene F. Williams Jr., pres., St. Luke's Hospital, 5535 Delmar Blvd., Zone 12, plans by Wells & Wells, Inc., engr.-archts., Security Bldg., Zone 2, 8 story, 55,000 sq. ft. medical bldg., Delmar Blvd. west of main hospital, **$3,000,000**.

▲ **Neb., Fort Crook**—HOUSING—Procurement Office, Offutt Air Force Base, Fort Crook, construct and finance, 616 units housing at or near Offutt Air Force Base, est. **$6,000,000**.

▲ **N. H., Hanover**—HOPKINS ART CENTER—Trustees Dartmouth College, John Sloan Dickey, pres., Hanover, plans by Campbell & Aldrich, 38 Newbury St., Boston, Mass., and Harrison & Abramovitz, 630 Fifth Ave., New York, N. Y. Hopkins Art Center, instructional auditorium bldg., theater bldg., **$2,000,000**. CD 2/10.

▲ **N. J., Camden**—SHOPPING CENTER—Henry Shandeling & Sons Corp., 1801 Nicollet Ave., Minneapolis, Minn., plans by Thorshov & Cerny, Inc., Metropolitan Bldg., Minneapolis, Minn. shopping center, **$5,000,000**.

▲ **N. J., Morristown**—HOTEL—Norman S. Kruvant & Assocs., 79 Lincoln Park, Newark, plans by Walter C. Pfeiffer, Washington St., Morristown, 150-room hotel to be known as Martha Washington Inn on 15-acre tract in Morris Twp. **$1,500,000**.

▲ **N. J., Ridgewood**—HOSPITAL—Valley Hospital, Linwood Ave. and North Van Dien Ave., plans by Ferrenz & Taylor, 152 W. 42 St., New York 36, N. Y. hospital expans. (addns). **$1,000,000**.

▲ **N. Y., Buffalo**—UNIVERSITY BLDGS.—University of Buffalo, 3435 Main St.,
cardiovascular and other medical research facilities, **$700,000**;
completion of physics bldg., **$500,000**;
health science center to house schools of pharmacy, nursing and biology dept., **$1,950,000**;
chemistry and chemical engineering laboratory, bldg. and facilities, **$1,850,000**;
new classroom bldg. and clinic center, reconstr. to accommodate College of Arts & Sciences, School of Social Work and School of Education, **$1,400,000**.

▲ **N. Y., Manhasset**—SCHOOL—St. Mary's Parish, c/o Albert F. Meissner, 90-50 Parsons Blvd., Jamaica, 3 story high school, Chapham Ave., **$1,000,000**.

▲ **N. Y., New York**—OFFICE—Metropolitan Life Insurance Co., 1 Madison Ave., Zone 10, plans by Voorhees, Walker, Smith & Smith, 101 Park Ave., Zone 17, 28 story office, 45-49 Wall St., **$10,000,000**.

▲ **N. Y., New York**—OFFICE—Pepsi-Cola Co., 3 W. 57 St., New York, Zone 22, plans by Skidmore,

(Continued on page 164)

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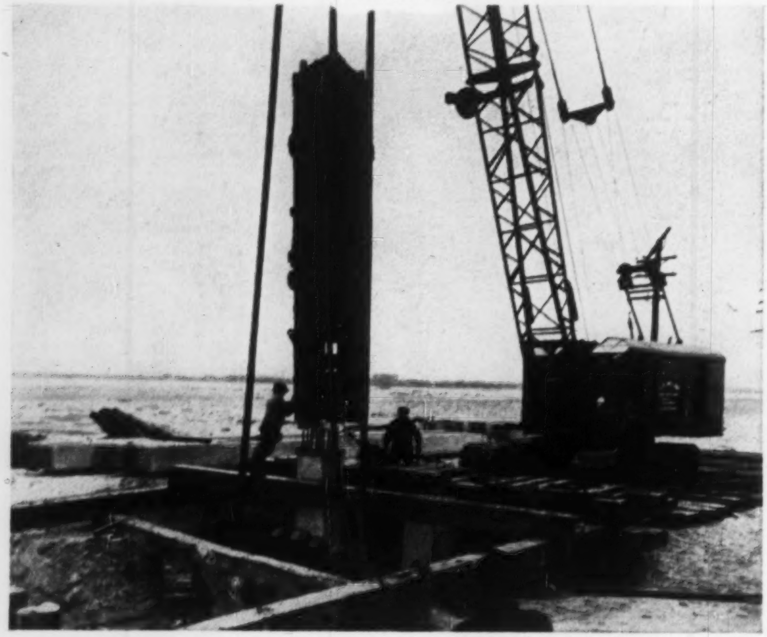

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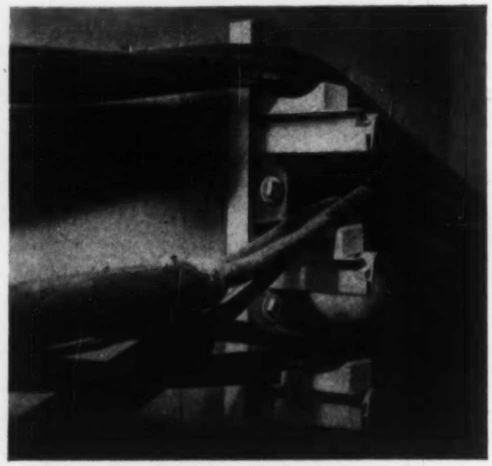
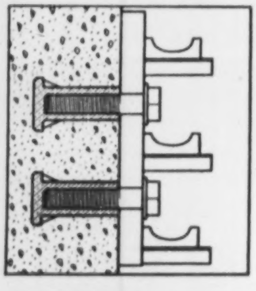


Power cables in huge Hicksville, L. I. shopping center suspended on cable racks in underground precast concrete boxes.



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New York 6, N. Y.

(Continued from page 162)

Owings & Merrill, 575 Madison Ave., Zone 22, office to house N. Y. headquarters at 500 Park Ave., southwest corner of 59 St., **$1,000,000.**

▲ **N. Y., Poughkeepsie**—HOSPITAL—Vassar Brothers Hospital, Reade Place, 5 story hospital wing, **$1,500,000.** CD 2/27/47.

▲ **O., Granville**—BUILDINGS—Bd. Trustees, Denison University, Granville, library addn., swimming pool and womens locker rooms, theatre workshop, laboratories for chemistry and physics, humanities classroom bldg., student union and faculty lounge, two dormitories for women, womens' dining hall and social center, phlysical education plant addns. **$8,000,000.** CD 3/28/50.

▲ **Ore., Portland**—OFFICE—Portland Federal Savings & Loan Assn., 333 S.W. 5 Ave., 10 story office, 5th and Washington Sts. **$2,000,000.**

▲ **Tex., Lubbock** —SCHOOL—Elizabeth's Catholic Church, c/o Rev. Thomas J. Drury, Lubbock, school, 30-acre tract. **$1,000,000.**

▲ **Tex., San Antonio**—HOSPITAL—Children's Hospital Foundation, c/o Jack Judson, pres., 131 Mary D St., plans by Phelps & DeWees & Simmons, 342 W. Woodlawn St., San Antonio and O'Connell & Probst, 504 W. 7 St., Austin, 100-bed hospital, **$1,500,000.** CD 11/15/54, under Santa Rosa Hospital.

▲ **Tex., Waco**—SHOPPING CENTER—Westwood Village, Inc. and R. E. Cox Co., Waco, plans by Spicer, Bush & Witt, archt.-engrs., 2125 Austin Ave., 1 story 165,000 sq. ft. brick, steel frame shopping center, Hy. 6 and Waco Dr. **$1,350,000.** Yandell, Cowan & Love, Fort Worth Natl. Bank Bldg., Fort Worth, consult. engrs.

▲ **Wash., Seattle**—HOUSES—Northlake Properties, Inc., 15500 Bothell Way, 150 houses, perimeter of Inglewood Country Club. **$1,500,000.**

▲ **Wis., Fox Point** (P. O. Milwaukee)—APARTMENT—Owner c/o A. M. Hurwitz, 7415 W. Mill Rd., plans by Perce G. Schley & Son, 1922 E. Capitol Dr., apartment bldg. **$1,250,000.**

▲ **Wis., Milwaukee**—APARTMENT—J. Rubin, 6129 N. Lake Dr., apartment bldg., **$3,000,000.**

▲ **Wis., Milwaukee**—APARTMENT—Thelka, Brunder & Assocs., 4143 N. Downer Ave., plans by George Zagel & Bros., 424 E. Wells St., Zone 2, 8 to 10 story 300x600 ft. apartment. **$5,000,000.**

▲ **Man., Winnipeg**—STORE—Simpson-Sears, Ltd., 176 Yonge St., Toronto, Ont., 150,000 sq. ft. department store. **$2,000,000.**

▲ **Ont., Toronto**—SHOPPING CENTER—Grand Union Carroll's, Ltd., 76 Biggar Ave., Hamilton, plans by Husband & Wallace, 30 Hunter St., W., Hamilton, shopping center, Sheppard Ave. and Yonge St. **$1,000,000.** CD 11/1/54.

INDUSTRIAL BUILDINGS

▲ **Calif., Oakland**—TINNING MILL—American Can Co., 100 Park Ave., New York, N. Y., tinning mill. **$7,000.000.**

▲ **Fla., Palatka**—MILL—Hudson Pulp & Paper Co., Palatka, 100,000 tons annually newsprint mill. **$25,000,000.** Paper machine awarded to Rice Barton Corp., 65 Tainer St., Worcester, Mass.

▲ **Ill., Broadview**—FACTORY—Spring Div., Borg Warner Corp., 718 S. 25 St., Bellwood, plans by Naess & Murphy, 80 E. Jackson St., Chicago, Zone 5, 300,000 sq. ft. factory, 22 and Puschek Rd. **$3,500,000.**

▲ **Ill., Skokie** — LABORATORY BLDGS. — Portland Cement Assn., 33 W. Grand Ave., Chicago, plans by Dunlap & Esgar, Inc., 333 N. Michigan Ave., Chicago, 2 laboratories, 5420 Harrison St. **$1,800,000.**

▲ **Minn., Lauderdale** — SERVICE BLDG. — Northern States Power Co., 15 S. Fifth St., Minneapolis, 1 story, 45,500 sq. ft. service bldg. for Minneapolis and St. Paul, **$1,000,000.** Constr. this Summer.

▲ **Mo., St. Louis County**—PLANT—American Box Board Co., Inc., Walter S. Goodspeed, pres., 470 Market St. S.W., Grand Rapids, Mich., 1 story 112,000 sq. ft., brick, steel, concrete plant to produce various types of corrugated shipping containers, office on 200,000 sq. ft. tract in Lindbergh-Warson Industrial Center, **$1,000,000.** CD 11/11/55, under Industrial Properties, Inc.

▲ **Mo., St. Louis County**—DISTRIBUTION CENTER—General Electric Appliance Div., General Electric Corp., 5021 Tyler Ave., St. Louis, Mo., plans by Syl G. Schmidt & Assoc., 1819 Railway Exchange, 611 Olive St., St. Louis, Zone 1, 1 story, 128,000 sq. ft. masonry, steel, concrete distribution center and warehouse incl. rail and truck loading facilities on 300,000 sq. ft. site in Lindbergh-Warson Industrial Center, **$1,000,000.** CD 11/11/55, under Industrial Properties, Inc.

▲ **Mo., St. Louis County**—WAREHOUSE, ETC.—United Biscuit Co. of America, Sawyer Biscuit Div., Melrose Park, Ill., 1 story, 25,000 sq. ft. distribution warehouse and office with trucking and rail facilities on 1.5 acre tract in Lindbergh-Warson Industrial Center, **$2,000,000.** CD 11/11/55, under Industrial Properties, Inc.

▲ **N. J., Edison**—PLANT—Aluminum Corp. of America, 230 Park Ave., New York 17, N. Y. and 1501 Alcoa Bldg., Pittsburgh, Pa., plans by Design Engineering Dpt. of Aluminum Corp. of America, 1501 Alcoa Bldg., Pittsburgh 19, Pa., 200,000 sq. ft. plant, 57-acre tract between Rte. 1 and N. J. Turnpike. **$1,500,000.**

▲ **N. J., Hillside**—TINNING MILL—American Can Co., 100 Park Ave., New York, N. Y., tinning mill, **$7,000,000.**

▲ **N. Y., Brooklyn**—PLANT—Metropolitan Bottling Co., 3 W. 57 St., New York, Zone 19, plans by Skidmore, Owings & Merrill, 575 Madison Ave., New York,

(Continued on page 166)

"...started with a rented CLEVELAND in 1949 ...now we own ten"

SO SAYS HUBERT S. ELEY, vice president and general superintendent of D. A. Foster Trenching Corp., of Merrifield, Va. Today the firm, employing about 200 men in the field, keeps its 10 Clevelands (Models 95, 110 and 140), constantly busy on trenching jobs of all kinds. Further excerpts from Mr. Eley's report:

"... we encounter all types of soils and terrain ... swamps, sand, rock, shale, clay ... stumps, boulders and other obstructions ... hill and flatland ... our Clevelands dig them all."

◆

"... we dig a gas or water house-connection in 15-20 minutes with one of our Clevelands."

◆

"... on building footings we dig 1,800-2,000 feet of 30" deep trench per day with a Cleveland."

◆

"... not necessary to stockpile large amounts of parts for Clevelands."

◆

"... fuel costs not a significant factor ... our Clevelands operate a working week on a tank of fuel."

◆

".. our Cleveland 140 paid for itself within 30 days."

◆

"... one of the many reasons we prefer Clevelands is their all-around adaptability ... besides our utilities work and footings contracts we use them for drainage trenching, septic tank installations and a wide range of other applications."

◆

"... we consider Clevelands the best all-purpose trenchers made ... the easiest to operate ... and the longest lasting."

Good *Everywhere*

THE CLEVELAND TRENCHER COMPANY

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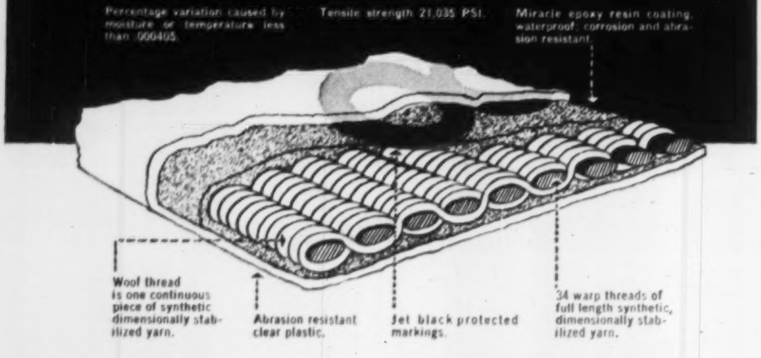
WHY LUFKIN HI-LINE WOVEN TAPES are more accurate


Percentage variation caused by moisture or temperature less than .000405.
Tensile strength 21,035 PSI.
Miracle epoxy resin coating, waterproof; corrosion and abrasion resistant.
Woof thread is one continuous piece of synthetic dimensionally stabilized yarn.
Abrasion resistant clear plastic.
Jet black protected markings.
34 warp threads of full length synthetic, dimensionally stabilized yarn.

BETTER MEASURE WITH LUFKIN

Here's a woven tape that approaches the accuracy of metal tapes. Made from continuous, synthetic, dimensionally stabilized fibres that are non-conductive and have high dielectric strength. The thirty-four lengthwise warp strands are interwoven with endless cross strands so that there are no ends to fray on the edges. Attractive leather case with rust-resistant steel liner. 25 to 150 foot lengths.

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PRECISION TOOLS
AT YOUR HARDWARE OR TOOL STORE

THE LUFKIN RULE CO., Saginaw Mich.
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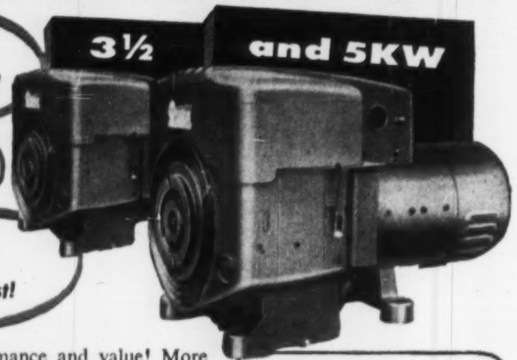
416

New ONAN CCK Electric Plants

MORE OUTPUT per pound of weight!

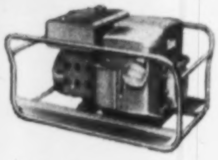
MORE OUTPUT per gallon of fuel!

MORE OUTPUT per dollar cost!



Way ahead in performance and value! More powerful, two-cylinder, air cooled Onan gasoline engines of 4-cycle, horizontally-opposed design give smooth, quieter, effortless performance. Short stroke and moderate speed cut engine wear, give longer life. Quality features include rotating Stellite-faced exhaust valves, solid Stellite valve seat inserts, full pressure lubrication. Onan's exclusive Vacu-Flo cooling system available for difficult or "buried" installations.

Completely Onan-built, with Onan gasoline engines direct-connected to Onan all-climate generators in compact, rugged units. Available in stationary, portable and standby models with a wide range of accessories.



PORTABLE MODELS
Available with carrying frames or 2-wheel dollies. Easily portable. Other Onan portable models: 500 to 10,000 watts.

Write for folder on all CCK models

D. W. ONAN & SONS INC.
2986 University Avenue Southeast, Minneapolis 14, Minnesota

(Continued from page 164)

Zone 22, 1 story, soft-drink bottling plant, 9701-9827 Ave. D., **$1,000,000.**

▲ Tenn., **Humboldt**—PLANT—Cleveland Fruit Juice Co., 3506 Vega St., Cleveland, O. and J. Hungerford Smith Co., 410 N. Guernsey St., Rochester, N. Y. plant to produce flavorings and process fruit. **$1,000,000.**

▲ Tex., **Diboll**—PLANT—Southern Pine Lumber Co., Diboll, fiber board mfg. plant. **$4,000,000.** CD 5/3/51.

▲ Texas—GENERATING PLANT—Deep East Electric Co-op., San Augustine, 10,000 kw wood-burning steam generating plant, near Pineland. San Augustine Co., **$2,238,000.** CD 10/7, under Unclassified.

▲ Tex., **Houston**—PLANT—Warren Petroleum Corp., c/o W. K. Warren, Natl. Bank of Tulsa Bldg., Tulsa, Okla. petrochemical plant, **$5,000,000;** warehousing-products storage, **$300,000;** bldg. site area earthwork, grading, **$100,000,** 300-acre site off Sheldon Rd. near San Jacinto River.

▲ Tex., **Pineland**—SAWMILL—Southern Pine Lumber Co., Dobill, sawmill and allied imprvs. **$2,000,000.**

▲ Alta., **Edmonton**—PLANT—Standard Iron & Engineering Works, Ltd., 107 Ave. and 120 St., fabrication plant. near here. **$1,500,000.** CD 2/13/52.

▲ N. S., **Abercrombie Point**—PAPER MILL—Scott Paper Co., Foot of Market St., Chester, Pa., paper mill, 500-acre site. **$35,000,000.**

▲ N. S., **Liverpool**—MILL—Bowater Corp. of North America, Ltd., 1980 Sherbrooke St. W., Montreal, Que. groundwood pulp mill with capacity of 100,000 tons per year. Est. over **$1,000,000.**

▲ Ont., **Barrie**—FACTORY—Canadian General Electric Co., Ltd., 212 King St. W., plans by Arthur H. Eadie, 220 Bloor St. W., Toronto, 1 story 120,000 sq. ft. brick factory addn. 80 Bradford St., **$1,000,000.**

▲ Ont., **Galt**—FACTORY—Canadian General Tower, Ltd., 52 Middleton Ave., factory exten., Middleton Ave. **$2,000,000.**

▲ Sask., **Regina**—PLANT—Western Clay Products, Ltd., 201 Connaught Block, Saskatoon, clay products plant. **$1,250,000.** Stadler, Hurter & Co., Drummond Bldg., Montreal, Que., consult. engrs. CD 11/23.

UNCLASSIFIED

▲ Calif., **San Diego**—PARK IMPRV.—City, Civic Center **$5,000,000,** voted bonds, Mission Bay Park Imprvt.

▲ Ill., **Chicago**—AMPHITHEATER—International Amphitheater, W. 42 and S. Halsted Sts., plans by A. Epstein & Sons Co., 2012 Pershing Rd., Zone 9, 112,000 sq. ft. amphitheater addn., **$1,500,000.**

▲† Miss., **Greenville**—POST OFFICE—General Services Admin., Public Bldgs. Service, General Services Bldg., 19 and F Sts. N.W., Wash. 25, D. C., post office and court house, **$1,235,000.**

▲ **Nebraska**—RURAL DISTRIBUTION LINES—SUBSTATIONS—Nebraska Public Power Sys., 2416 14th St., Columbus,
heavy duty line, Nelight to Creighton.
high voltage line, Broken Bow to North Platte. Bids August or September 1956.
high voltage line, Oakland to Winnebago. Bids August or September 1957.
high voltage line, Albion to North Loup. Bid date indefinite.
Humbolt substation addn. Bids Fall 1956.
Oakland substation addn., Bids Spring 1958.
Beemer Substation addn. Bids Sept. 1956.
College View Substation addn. Bids late 1957.
West Lincoln substation addn. Bids October 1956.
Lincoln Second Street Substation addn. Bids October 1956.
Neligh Substation addn. Bids October 1956.
Kearney Substation addn. Bids September 1956.
Albion Substation addn. Bid date indefinite.
Loup City Substation addn. No bids.
Lexington Substation. Bids Fall 1956.
Central City Substation. Bids Fall 1956.
Seward Substation. Bids February 1957.
Winnebago Substation. Bids late 1959. Total est. **$7,000,000.** CD 5/31/49.

▲ N. J., **Hoboken**—TRACKS, etc.—The Delaware, Lackawanna & Western RR Co., George Phillips, ch. engr., Hoboken Terminal, Hoboken, change-over and exten. of tracks, yards facilities and terminal facilities. **$2,000,000.**

▲ O., **Lancaster**—COLISEUM—Fairfield Co., Court House, bond election November 6, 2-story coliseum adjacent to Fairfield County fairgrounds. **$1,000,000.**

▲ Texas—CHEMICAL PIPE LINE—Texas Butadiene and Chemical Co., Ship Channel, Houston, chemical pipe line between Houston and South Texas Sabine area **$1,000,000.**

▲ Texas—PIPE LINE—Warren Petroleum Co., City Natl. Bank Bldg., Houston, pipe line in area between Houston and south Texas Sabine area, Houston, **$1,000,000.**

▲ Tex., **Houston**—WHARF—Harris County Houston Ship Channel Navigation Dist., c/o Wharf 3, exten. of Wharf No. 16. **$1,000,000.** Robert J. Cummins, Bankers Mortgage Bldg., consult. engr.

▲ Tex., **Lubbock**—STADIUM—Texas Technological College, Lubbock, stadium, **$1,500,000.**

▲ Virginia—RURAL DISTRIBUTION LINES—Prince William Electric Co-op., Manassas, 250 mi. rural distr. lines. addnl. headquarters facilities, 9 mi. 34.5 kv. transmission line and sys. imprvs., Prince William Co., **$1,040,000.** CD 2/28/49.

▲ N. S., **Halifax**—TRACKLAYING—Canadian Pacific Ry., C. A. Colpitts, ch. engr., Windsor Station, Montreal, Que., tracklaying and equip. **$2,000,000.**

▲ Ont., **Hill Island** — (Gananoque) — RESORT — Brock Realty Co., King St. W., Brockville, plans by H. H. Roberts, Westport, resort development motels, yacht club, residences, restaurants, etc. **$2,000,000-$3,000,000.**

34 YEARS OLD — Alabama St. in Winchester. Paved in 1922. Photos taken in 1922 and in 1955.

37 YEARS OLD—Columbia St. in Newport. Paved in 1919. Photos taken 1921, 1955.

HERE TODAY *and still here tomorrow*

That's the story of Kentucky's CONCRETE STREETS

All of these streets in the Bluegrass state were built before the use of the longitudinal center joint. Hence they were more susceptible to cracking than pavements built later. Yet, having served for more than a third of a century, they still are giving dependable, economical, year-around service.

Long service such as this is typical of concrete streets in all parts of the country. And today, because of significant improvements in engineering design, materials and construction methods, concrete pavements can be built with a life expectancy of 50 years and more! Yes, concrete pavement delivers true ***low-annual-cost*** service.

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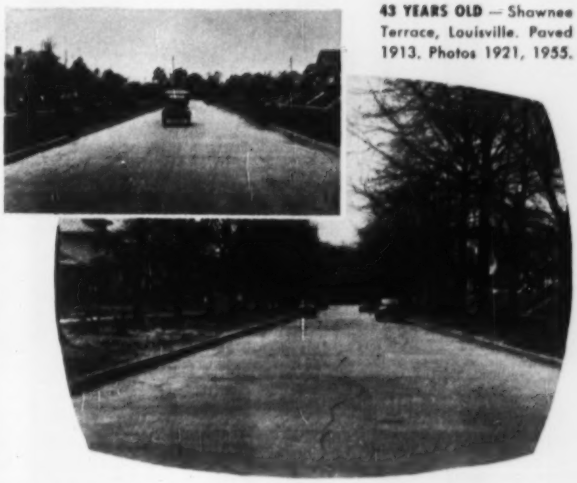
Dept. 7a-17, 33 West Grand Avenue, Chicago 10, Illinois

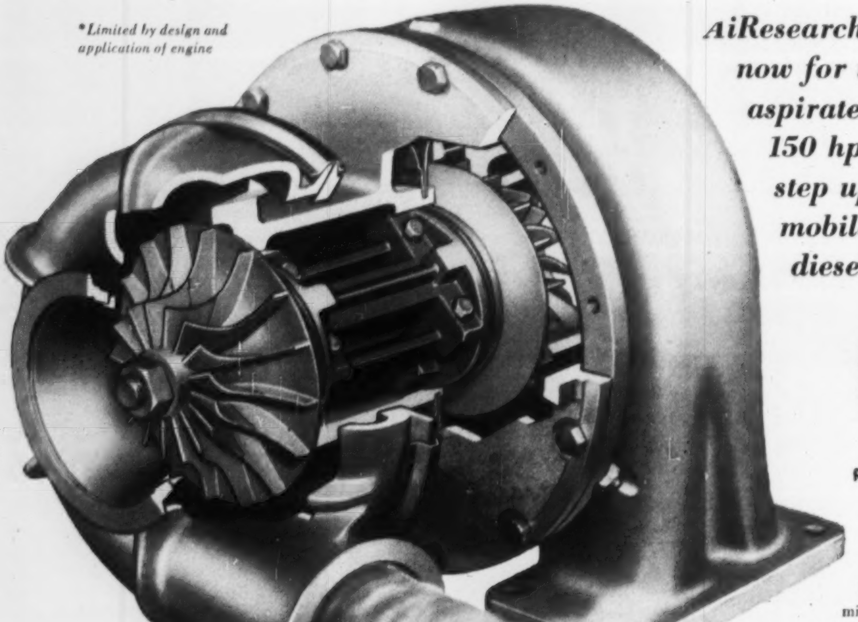
43 YEARS OLD — Shawnee Terrace, Louisville. Paved 1913. Photos 1921, 1955.



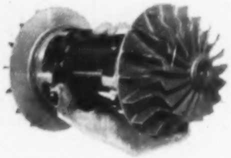
39 YEARS OLD—Mt. Pleasant Ave. in Ft. Thomas. Paved in 1917. Photos 1917 and 1955.

AiResearch Turbochargers improve diesel engine performance up to 100%*

**Limited by design and application of engine*



AiResearch units are available now for use with normally aspirated diesel engines of 150 hp and up. They step up performance of both mobile and stationary diesels, land or marine.



Removable cartridge simplifies repair and overhaul

This cartridge contains the turbocharger's rotating assembly, bearings and seals in a factory balanced package. It can be replaced in minutes with another factory balanced cartridge by a mechanic on the scene.

AiResearch has more experience in the design and manufacture of small turbomachinery than any other company. AiResearch turbochargers are the most efficient and safest units of their kind. New additions to the AiResearch family of turbochargers have widened their range of application in the diesel engine industry.

Our engineers welcome the opportunity to work with you in improving the performance of your diesel engines. We are happy to confer on applications of the turbocharger principle to your power plants.

AIRESEARCH TURBOCHARGERS NOW AVAILABLE

MODEL	T-10	T-15	T-16	T-30
Diameter — in. nom.	9	15¼	11½	15¼
Length — in.	9	16¾	15¾	17¼
Weight — lb.	39	125	100	135
Output — lb/min. (Standard Conditions)	25-40	35-65	45-65	70-95

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AiResearch Industrial Division

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DESIGNERS AND MANUFACTURERS OF TURBOCHARGERS AND RELATED MACHINERY

Bids—Low Bids—Contracts—Second Section

NEW ENGLAND

HEAVY CONSTRUCTION—BA

STATE HIGHWAY LETTINGS
BRIDGES
July 12 Massachusetts July 16 Connecticut
STREETS AND ROADS
July 10 Massachusetts July 16 Connecticut

HEAVY CONSTRUCTION—LB & CA

▲ **CONNECTICUIT**—State Hy. Comn., State Office Bldg., Hartford,

Conn.—**M. A. Gammino Constr. Co.**, 728 Valley St., Providence, R. I. and **Brunalli Constr. Co.**, Somers St., Plainville, Conn. LB **$5,269,129**, est. $4,000,000. (10 bidders) Proj. 108-69. 27,004 lin. ft. grading, drainage, b. conc. pavement Connecticut Turnpike, incl. 7 grade separation structures and 1 rein.-con. box culvert, Plainfield and Killingly; LB **$5,676,867**, est. $6,000,000. (6 bidders) Proj. 328-04, 37,753 lin. ft. grading, drainage, b. conc. pavement on Connecticut Turnpike, incl. 10 grade separation structures, railroad and stream crossing structure, stream crossing structure, 2 rein.-con. box culverts, Lisbon, Griswold and Plainfield. Bids June 25. CD 6/7.

BUILDINGS—LB & CA

▲† **John Volpe Constr. Co., Inc.**, 1507 M St. N. W., Wash., D. C. LB **$2,865,347**, (5 bidders) ADMISSION AND TREATMENT BLDG. No. 78, Veterans Admin. Hospital, BEDFORD, MASS. Veterans Admin., Munitions Bldg., Wash., D. C. Bids June 26. CD 5/3.

MIDDLE ATLANTIC

HEAVY CONSTRUCTION—BA

STATE HIGHWAY LETTINGS
BRIDGES
July 10 Maryland July 26 New York
STREETS AND ROADS
July 10, 17 New Jersey July 26 New York

HEAVY CONSTRUCTION—LB & CA

▲ **NEW YORK**—John W. Johnson, supt. State Dpt. P. Wks., Gov. Alfred E. Smith State Office Bldg., Albany,

N. Y.—**Norman L. Kieffer Constr. Co. Inc.**, Lancaster, N. Y., LB **$366,048** Est. $436,000. (6 bidders) resurf. 4.56 mi. sect. of Niagara Falls Blvd. (Rte. 18 and 62) starting at Buffalo city line and exten. northward to Ellicott Creek, Erie Co.

N. Y.—**John M. Robertson, Inc.**, 59-61 Ceperly Ave., Oneonta, N. Y., LB **$607,202**. Est. $806,000. (7 bidders) resurf. 26.05 mi. Rte. 11 from Cicero northward to Brewerton and from Hastings northward through Maple View, Pulaski and Sandy Creek to Jefferson Co. line, Onondaga and Oswego Counties.

N. Y.—**Paragon Engineering Co.**, 23 Elm St., Oneonta, N. Y., LB **$233,118**. Est. $267,000. (3 bidders) constr. 2.16 mi. portion of Rte. 153 secondary hy. from Rte. 154 at Poestenkill southwestward to Rte. 66, Rensselaer Co.

N. Y.—**Tully & Dinapoli, Inc.**, 127-50 Northern Blvd., P.O. Box 145, Flushing, N. Y., LB **$5,063,316**. Est. $5,068,000. (2 bidders) constr. 1.09 mi. sect. of Horace Harding Expressway and 2.56 mi. access and service roads, between 136 St. and Parsons Blvd. incl. constr. of two hy. grade separation structures and one pedestrian overpass, Queens Co.

N. Y.—**D. A. Collins Construction Co., Inc.**, 55 N. Main St., Mechanicville, N. Y., LB **$135,697**. Est. $167,000. (7 bidders) relocation and reconstr. of 0.76 mi. sect. of Rte. 197 where it crosses the D. & H. R.R. spur in the town of Moreau just southwest of Fort Edward, Saratoga Co.

N. Y.—**C. D. Murray Co., Inc.**, 701 Westcott St., Syracuse, LB **$108,846**. Est. $111,000. (1 bidder) resurf. 1.58 mi. portion of Rte. 5 and 20 east of Geneva, starting at Seneca-Ontario Co. line and exten. eastward to North St. in East Geneva, Seneca Co.

N. Y.—**Central N. Y. Contracting Co., Inc.**, 505 Loew Theatre Bldg., Syracuse, N. Y., LB **$109,943**. Est. $119,000. (3 bidders) resurf. 3.08 mi. Rte. 34 starting in South Lansing and exten. southward to Rte. 34A intersection of Esty Glen, Tompkins Co.

N. Y.—**H. L. Baughman, Inc.**, 1240 Jefferson Rd., Rochester, N. Y., LB **$72,018**. Est. $77,000. (2 bidders) resurf. 1.33 mi. Rte. 13 in village of Dryden starting at east corporation line and exten. through village, eastward then northward to north corporation line, Tompkins Co.

N. Y.—**Mount Vernon Contracting Corp.**, 439 North Terrace Ave., Mount Vernon, N. Y., LB **$2,646,376** Est. $2,650,000. (1 bidder) constr. 0.92 mi. portion of State Thruway's New England sect. between North St. and Boston Post Rd. in city of Rye, 0.59 mi. of access roads incl. constr. of hy. grade separation structures at Central Ave., Locust Ave. and Purchase St. and bldg. of new bridge over Blind Brook, Westchester Co.

N. Y.—No bids received 6/28/56. Est. $2,350,000. reconstr. 2.7 mi. Rte. 298 (Court St.) and constr. 2.11 mi. of access roads from the Syracuse city line eastward through Lyncourt to Thompson Rd. traffic circle, involving constr. of new six-lane divided concrete hy. and constr. of traffic circle just east of Town Line Rd., Onondaga Co. Bids June 28. CD 6/1.

▲ **NEW YORK**—John W. Johnson, supt., P. Wks. Dpt., The Gov. Alfred E. Smith State Office Bldg., Albany,

N. Y.—**Harris Structural Steel Co., Inc.**, New York, N. Y., LB **$8,572,150**. Est. $8,950,000. (4 bidders) superstructure for 1.05 mi., 3 continuous truss spans bridge over Hudson River from south of Selkirk to Castleton incl. 13,000 tons steel, Albany and Rensselaer Counties. Bids June 28. CD 6/13.

▲ **C. J. Langenfelder & Son, Inc.**, 8427 Pulaski Hy., Baltimore, Md. CA **$4,015,305**. PT-129 constr. part of North approach expressway approx. 4.2 mi. incl. 6 bridges, Baltimore, part of Patapsco Tunnel Proj., MARYLAND. State Rds. Comn., 108 E. Lexington St., Baltimore 2, Md. CD 6/19, under LB.

BUILDINGS—LB & CA

▲ **F. D. Rich Co., Inc.**, 550 Summer St., Stamford, Conn. CA **$6,577,000**. general constr. MEDICAL-SURGICAL CENTER (Bldg. No. 96) Gowanda State Homeopathic Hospital, HELMUTH, N. Y. Bureau Contracts & Accounts, The Gov. Alfred E. Smith State Office Bldg., Albany, N. Y. CD 6/1, under LB.

▲ **Pinebrook Homes**, c/o Joseph Kaprow, archt., 277 North Ave., New Rochelle, N. Y. Owner Builds. **$4,000,000**. 137 HOUSES on tract on Hillandale Dr. near Weaver St., NEW ROCHELLE, N. Y.

▲ **C & C Home Builders**, (Julian and Leo Chmil) 2334 Woodland Ave., South Plainfield, N. J. Owner Builds. **$3,060,000**, 102 HOMES Foothills and Adamsville Rds. to be known as "Crestwood" in Bridgewater Twp., BOUNDBROOK, N. J. Stephen J. Potter, 410 Colonial Ave., Union, N. J., archt.

▲ **S. Stephens Atkins**, c/o Lee Siddel & Co., 325 Lake Ave., Metuchen, N. J., Owner Builds, **$2,250,000**. 142 HOMES, Route 516, RARITAN TWP., N. J. Percy S. Simon, 362 Cedar Lane, Teaneck, N. J., archt.

▲ **Charles J. Rocco**, Old Woods Rd., Saddle River, N. J., CA, **$2,500,000**. 62 HOUSES off Route 17 to be known as "Saddle River Acres", SADDLE RIVER, N. J. Chas. J. & Thomas C. Rocco, Old Woods Rd., Saddle River, N. J. Eugene J. Maniscalco, 909 Main St., Hackensack, N. J., archt.

▲ **Standard Constr. Co.**, 1010 Vermont Ave. N.W., Wash., D. C. CA Est. **$2,000,000**. Congressional SHOPPING CITY consisting of 75 stores on 50 acre

(Continued on page 171)

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Where floor space is a problem — or where stacking and paralleling is indicated — the new Miller SRH LOWBOY is the engineered-to-your-needs answer! This dc rectifier type welder is available in three models with 60% duty cycle ratings of 200, 300 and 400 amperes. Combining compactness with quiet operation, minimum arc blow, top electrical efficiency and waterproof construction, the LOWBOY is *another* Miller first that "figures."

Upright SR models to 600 amperes at 40 volts with 750 amperes maximum output; Duplex units up to 1200 amperes, 40 volts, 1500 amperes maximum.

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Have better appearance... require less maintenance...

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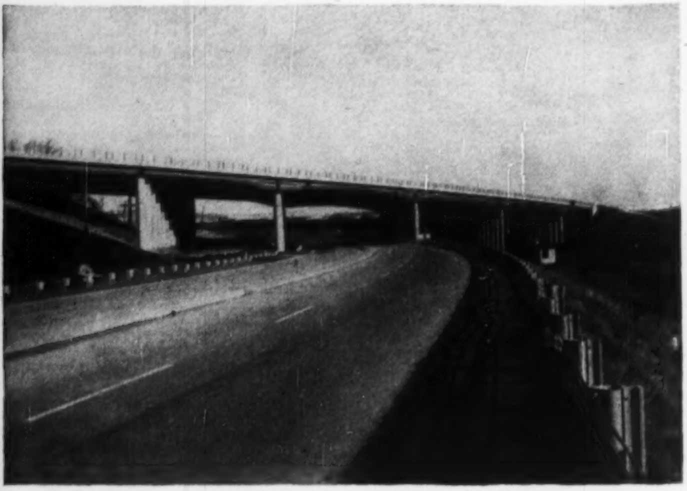
WHY don't you design all bridges and buildings for welding



100% welded deck cantilever plate girder bridge for New York Thruway. Has 6 spans totaling 775 feet. Fabricated and erected by Phoenix Bridge Company, Phoenixville, Pa. Designed in office of C. F. Blanchard, Deputy Chief Engineer, New York State Department of Public Works, Albany, N. Y.

COST SAVINGS OF 15% TO 20% REALIZED IN WELDED BRIDGE DESIGNS

FOR reasons of economy, increased public safety and pleasing appearance, welding has become the standard for deck highway bridges in the State of New York. When continuous design (made possible by welding) is used, overall depths of bridge deck are reduced to afford necessary headroom under bridge at maximum economy. Savings in foundations and fills are substantial and are in addition to savings in steel, a cost which alone averages 15% to 20% over similar riveted structures.

Studies in Structural Arc Weldings are available to designers and structural engineers by writing:

THE LINCOLN ELECTRIC COMPANY

Dept. 2317 • Cleveland 17, Ohio

Pioneer in Welded Structures . . . for Lower Cost

(Continued from page 169)

site at Congressional Airport, ROCKVILLE, MD. Arthur C. Hyde, Congressional Airport, Rockville, Md. Rinaudot & Coupard, 7240 Wisconsin Ave., Bethesda, Md., archts. CD 11/1.

▲† **John Tester & Sons, Inc.**, Clinton, Md. CA **$2,137,217.** constr. P.I.C. BLDG. and FILM VAULT, SUITLAND, MD. Dist. P. Wks. Office, Potomac River Naval Command, Naval Gun Factory, Wash., D. C. Bids June 20, awarded June 26. CD 6/22, under LB.

SOUTH

HEAVY CONSTRUCTION—BA

STATE HIGHWAY LETTINGS

BRIDGES

July 18 Tennessee

STREETS AND ROADS

July 18 Tennessee

BUILDINGS—LB & CA

▲† **Farnsworth & Chambers Co., Inc.**, 3018 Leeland St., Houston, Tex., LB **$4,903,870**, (3 bidders) eight 3 story 326-man BARRACKS, ENG-44-110-56-35, FORT LEE, VA. U. S. Eng., foot of Front St., Norfolk 1, Va. Bids June 26. CD 6/11.

▲ **Algernon Blair Co.**, 1st Natl. Bank Bldg., Montgomery, Ala. Owner Builds. **$4,000,000.** 309 HOMES, Franconia Rd., 3.5 mi. from Franconia-Springfield Cloverleaf, to be known as "Winslow Hills", FRANCONIA, VA.

▲ **Barksdale & LeBlanc**, 6425 Greenwell Springs Rd., Baton Rouge, La. CA **$2,014,000.** 7 story, 75,000 sq. ft. brick HOSPITAL addn., BATON ROUGE, LA. Our Lady of the Lake Hospital, Nurses' Home Auditorium, Across Dyke, Baton Rouge, La. CD 6/6, under LB.

▲ **Foster & Creighton Co.**, American Natl. Bank Bldg., Nashville, Tenn., CA **$2,137,657**, six men's DORMITORIES, NASHVILLE, TENN. Vanderbilt University, Nashville 5, Tenn. CD 5/25, under LB.

MIDDLE WEST

HEAVY CONSTRUCTION—BA

STATE HIGHWAY LETTINGS

BRIDGES

July 11 Michigan

STREETS AND ROADS

July 10, 11 Michigan July 10 Ohio

BUILDINGS—BA

▲ **O., Cincinnati**—HOSPITAL—BA 7/17—Good Samaritan Hospital, Clifton Ave., hospital addn. Est. $3,800,000. Total est. $6,000,000. Maguolo & Quick, Temple Bar Bldg., archts.-structural engrs. Harry F. Wilson Assocs., Inc., 4908 Delmar St., St. Louis, Mo., consult. engrs. CD 8/17.

HEAVY CONSTRUCTION—LB & CA

▲ **Rust Eng. Co.**, 575 6 Ave., Pittsburgh, Pa., CA **$4,018,299**, est. $4,500,000. Secondary Sewage Treatment Plant, Bay View Park, TOLEDO, O. City, Howard Rebensal, comr. Purchases, City Hall, Toledo, O. Bids May 1, awarded June 21. CD 5/7, under LB.

▲ **American Bridge Div., U. S. Steel Corp.**, 525 W. Wm. Penn Pl., Pittsburgh, Pa., CA, **$6,835,170.** superstructure high-level cantilever bridge over Calumet River Section 6-C, CHICAGO, ILL. City, City Hall, Chicago, Ill. Bids Apr. 23. CD 4/27, under LB.

WEST OF MISSISSIPPI

HEAVY CONSTRUCTION—BA

STATE HIGHWAY LETTINGS

BRIDGES

July 10 Oklahoma July 12 Kansas
July 17, 18 Texas

STREETS AND ROADS

July 10 Oklahoma July 12 Kansas
July 17, 18 Texas

BUILDINGS—LB & CA

▲ **Southern Pine Lumber Co.**, Diboll, Tex. Owner Builds. **$4,000,000.** fiber board mfg. PLANT; **$2,000,000,** SAWMILL, DIBOLL, TEX. CD 6/21.

▲† **Lawless & Alford, Inc.**, P. O. Box 600, Austin, Tex., LB **$3,592,327**, est. $3,579,908. eight 3-story BARRACKS, ENG-41-443-56-90, FORT HOOD, TEX. U. S. Eng., 100 W. Vickery Blvd., Fort Worth, Tex. Bids June 26. CD 6/15.

▲† **C. L. Browning, Jr.**, 903 Basse St., San Antonio, Tex., LB **$5,314,446** Sch. 1; LB **$4,968,446** Sch. 1A. permanent family HOUSING, ENG-25-066-56-85, CAMP CARSON, COLO. U. S. Eng., 1709 Jackson St., Omaha, Neb. Bids June 21. CD 5/25.

FAR WEST

HEAVY CONSTRUCTION—BA

STATE HIGHWAY LETTINGS

BRIDGES

July 25 California

STREETS AND ROADS

July 13 Oregon

BUILDINGS—BA

▲ **Wash., Seattle**—SCHOOL—BA 7/24—School Dist. No. 1, 815 4 Ave. N., three rein.-con. Southwest Seattle Senior High School bldgs., W. Thistle St. and 27 Ave. S.W. $2,000,000. Plans deposit $50. Extended date. Naramore, Bain, Brady & Johanson, 904 7 Ave., Seattle, Zone 1, archts. CD 6/1.

HEAVY CONSTRUCTION—LB & CA

▲ **Rogers Brothers Co.**, Idaho Falls, Idaho, CA **$1,744,875.** steel pipe for natural gas distr. sys., IDAHO FALLS, IDAHO. Idaho Falls Co-operative Gas Assn., Idaho Falls, Idaho.

▲† **Winston Brothers Co.**, 1532 California St., Monrovia, Calif. LB **$8,576,388**, est. $8,388,009. (8 bidders) Casitas Dam, Ventura River Proj. near Ventura, Spec. DC-4701, CALIFORNIA. Bureau Reclamation, Dpt. Interior, Oak View, Calif. Bids June 21. CD 5/21.

▲ **Healy Tibbets Constr. Co.**, 411 Brannan St., San Francisco, Calif., LB **$2,529,044** (only bidder) Ocean outfall for sludge discharge at Hyperion Treatment Plant, LOS ANGELES, CALIF. City, City Hall, Los Angeles, Calif. Bids June 27. CD 6/7.

BUILDINGS—LB & CA

▲† **Donald M. Drake Co.**, 1600 Northwest Savier St., Portland, Ore., LB **$6,446,404**, est. $6,090,327 (5 bidders) 10 BARRACKS Inv. 56-204, FORT LEWIS, WASH. U. S. Eng., 4735 E. Marginal Way, Seattle 4, Wash. Bids June 25. CD 6/18.

▲ **Robert E. McKee, General Contractors, Inc.**, 4700 San Fernando Rd. West, Los Angeles, Calif. LB **$2,838,000**. (3 bidders) general contract, two 2 story, part bsmnt., 135,600 sq. ft. each. WARD BLDGS., Metropolitan State Hospital, NORWALK, CALIF. State Div. Architecture, 1100 S. Grand Ave., Los Angeles, Calif. Bids June 20;
S. Glen Hickman Co. & Hickman Bros., Inc., 3170 E. 11 St., Los Angeles, Calif. LB **$877,450.** (5 bidders) mechanical work (Norwalk, Calif.).

▲† **William & Burrows Co.**, 500 Harbor Blvd., Belmont, Calif. LB **$2,323,890.** (5 bidders) permanent BOQ BLDG., Treasure Island, NOy 91701, Spec. 50113, SAN FRANCISCO, CALIF. Dist. P. Wks. Office, Twelfth Naval Dist., San Bruno, Calif. Bids June 21. CD 6/1.

CANADA

HEAVY CONSTRUCTION—LB & CA

▲ **F. E. Shaw Ltd.**, 530 S. Vidal St., Sarnia, Ont., CA, **$8,000,000**, gas pipe line to serve Port Arthur, Fort William, Dryden, Nipigon and Geraldton all in northern ONTARIO. Twin City Gas Co. Ltd., c/o F. E. Shaw Ltd., 530 S. Vidal St., Sarnia, Ont. Awarded June 20.

(Continued on page 173)

Prevents Cracks..
Preserves Beauty
Trussed Design
Butt Weld • Deformed Rods
DUR-O-WAL®
the Backbone of Steel
for EVERY masonry wall

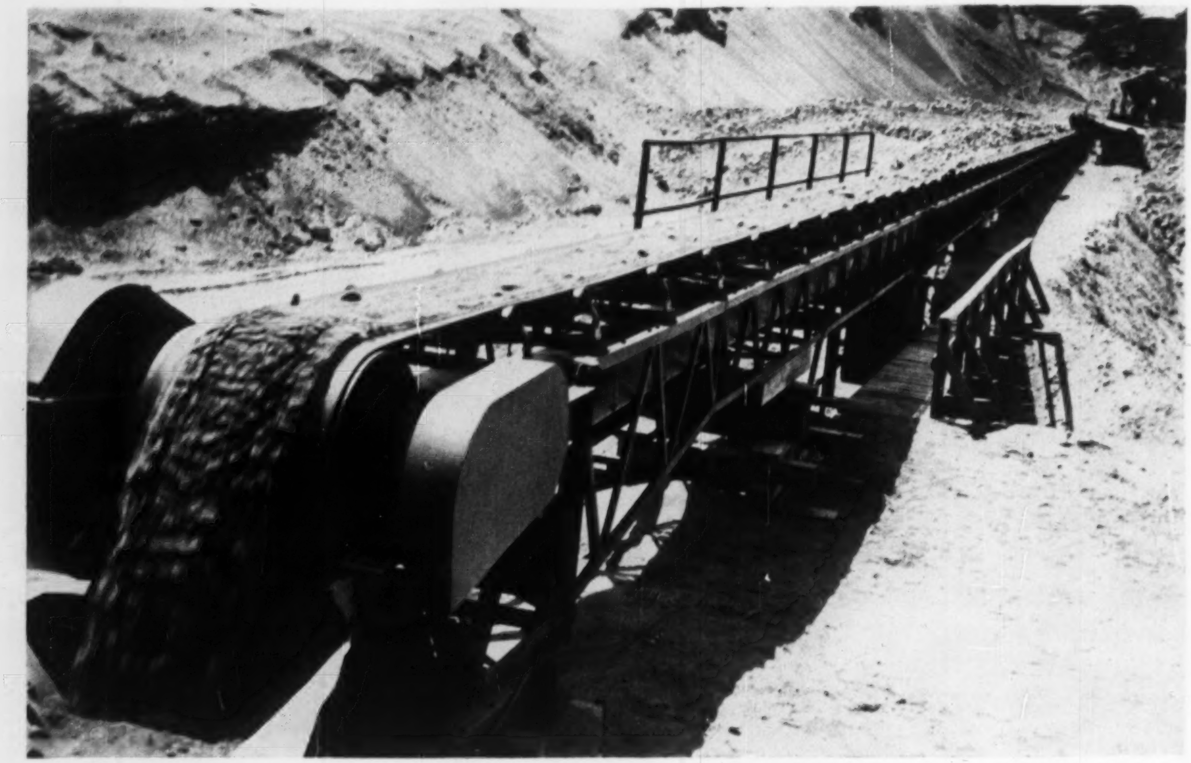
Call, wire or write Dept. 2N today, for complete information on Dur-O-waL. Literature available with research data from independent tests.

Dur-O-waL Div., Cedar Rapids Block Co., CEDAR RAPIDS, IA. Dur-O-waL Prod., Inc., Box 628, SYRACUSE, N.Y. Dur-O-waL of Ill., 119 N. River St., AURORA, ILL. Dur-O-waL Prod. of Ala., Inc., Box 5446, BIRMINGHAM, ALA. Dur-O-waL Prod., Inc., 4500 E. Lombard St., BALTIMORE, MD. Dur-O-waL Div., Frontier Mfg. Co., Box 49, PHOENIX, ARIZ. Dur-O-waL, Inc., 165 Utah St., TOLEDO, OHIO

Dur-O-waL is the original steel reinforcing member designed to combat cracking of masonry walls. To add structural soundness and to preserve the beauty in the buildings you design, specify Dur-O-waL. It lays flat in the mortar bed . . . handles fast . . . provides crack control for every type of masonry wall.

Dur-O-waL Data

• Mechanical Bond every 8 inches of wall • **High Tensile Steel** (conforms to ASTM Standard A-82-34) • **Double Mortar Lock** at each weld • **Electric Butt Welds** place all rods on a single plane • **Deformed Side Rods** lay straight and flat due to hardness of steel • **Trussed Design** causes side rods to work together.



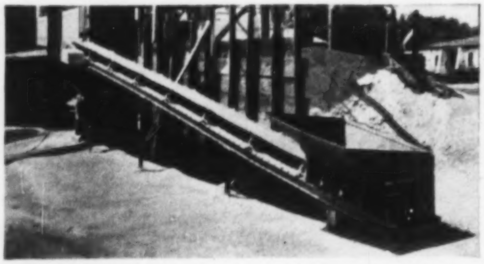
LONG HAUL—Even the longest Barber-Greene Conveyors are built of standardized components . . . produced on a precision, quantity production basis. They can be assembled in almost limitless combinations to cut the time and cost of any material handling job.

Long or short haul—it costs less to move materials with belt conveyors

Thousands of installations—ranging from a few feet to thousands of feet—prove that belt conveyors move bulk material at lowest cost.

No other machine is so simple in construction or requires so little maintenance. No other machine can deliver such high hourly capacities with so little power or attention.

Barber-Greene has given a new meaning to belt conveyor economy. Built of standardized components, Barber-Greene Conveyors are delivered sooner . . . require less engineering . . . are erected faster . . . give top performance . . . and are more easily altered to meet changing or expanding requirements. Being standardized, repair parts are readily available—usually from the stock of your local distributor.



SHORT HAUL—Even the shortest Barber-Greene Conveyors are available in standardized components in the width and length to suit your needs. These small conveyors provide the economical way to handle the widest range of materials with greatest flexibility.

56-7-PE

Send for this 192-page conveyor book. It's comprehensive, easy to use.
Write for Catalog 76-A on your company letterhead.

Barber-Greene
Conveyors

See you at the ROAD SHOW

Barber-Greene BG

AURORA, ILLINOIS, U.S.A.

CONVEYORS . . . LOADERS . . . DITCHERS . . . ASPHALT PAVING EQUIPMENT

(Continued from page 171)

BUILDINGS—LB & CA

▲ **E. G. M. Cape & Co.**, 620 Cathcart St., Montreal, Que., Est. over **$2,000,000.** MINING PLANT, incl. 2 mills, BLIND RIVER, ONT. Northspan Uranium Mines Ltd., 111 Richmond St. W., Toronto, Ont. General Eng. & Contg. Ltd., 100 Adelaide St. W., Toronto, Ont., and Kilborn Eng. (1954) Ltd., 36 Parklawn Rd., Toronto, Ont., engrs. Awarded June 25.

▲ **C. A. Parsons of Canada Ltd.**, Royal Bank Bldg., Toronto, Ont., CA, **$3,400,000.** two turbo-generators for STEAM POWER PLANT, Boundary Dam Power Station on Long Creek, ESTEVAN, SASK. Saskatchewan Power Corp., 1739 Cornwall St., Regina, Sask. Awarded June 21, Grand total $6,400,000. CD 2/24. **Combustion Eng. Corp. Ltd.**, 69 Yonge St., Toronto, Ont., CA, **$1,500,000.** boilers (Estevan, Sask.); **Babcock-Wilcox & Goldie-McCulloch Ltd.**, 64 Grand St., S. Galt, Ont., CA **$1,500,000.** boilers (Estevan, Sask.)

AMERICANS ABROAD

HEAVY CONSTRUCTION—BA

▲ Bids are being taken on the following projects under International competitive bidding of NATO

FRANCE

Ministere de la Defense Nationale et den Forces Armees Direction de l'Infrastructure de l'Air, Boulevard Victor, Paris.

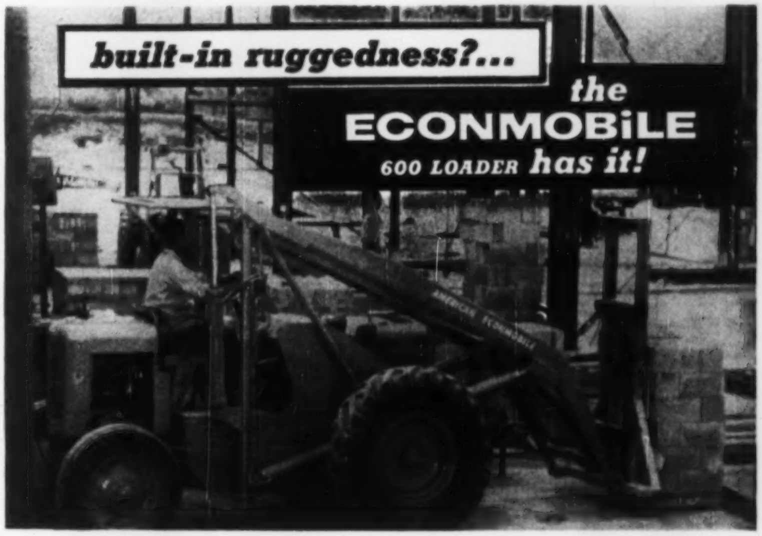
constr. runway, highways, various areas on the Broye-Lee-Pesmes Airfield. Est. $3,142,857. Firms interested in bidding should apply before July 3. Bid date is set for August 20. A brochure describing the NATO international bidding program is available on request from the Trade Development Division, Bureau of Foreign Commerce, U. S. Department of Commerce, Wash. 25, D. C. or from any of the Department's Field Offices.

▲† **Oman-Farnsworth-Wright** (Oman Constr. Co., P.O. Box 146, Nashville, Tenn., R. P. Farnsworth & Co., Inc., 1515 S. Salcedo St., New Orleans, La., R. H. Wright, Jr. & Assocs., Brookhaven Rd., Columbus, Ga.) 57 John St., New York, N. Y., U. S. A. CA Est. **$30,000,000.** air base, PAKISTAN. Mediterranean Div., U. S. Eng., 176 Broadway, New York, N. Y., U. S. A.

FOREIGN

HEAVY CONSTRUCTION—LB & CA

▲ **Soccoman Co.**, French Morocco. CA **$4,043,557.** Stage 2, water proj., PORT ELIZABETH, UNION OF SOUTH AFRICA, City of Port Elizabeth, City Hall, Port Elizabeth, Union of South Africa. Bids Mar. 15. CD 3/22, under LB.



Outstanding performance is guaranteed by the fact that the ECONMOBILE has been 100% stressed at every point. And—with the loader carried over the large rear tires—the load is properly distributed throughout the entire chassis.

The ECONMOBILE has these other outstanding features: Hoisting height up to 22'; reach up to 6'; power; stability; versatility; mobility; maneuverability; traction and flotation.

The savings in general labor effected through the use of the ECONMOBILE exceeds 70%.

ECONMOBILE
Reg. U.S. Pat. Off.

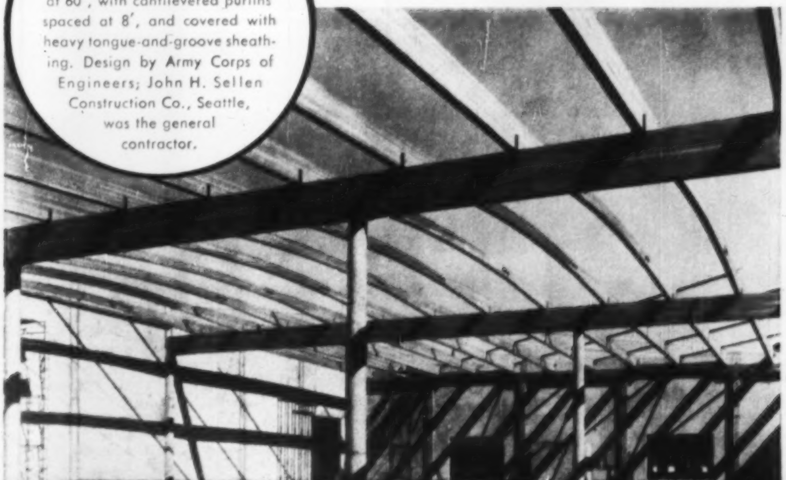
write, wire
or call

AMERICAN ROAD EQUIPMENT COMPANY
4306 North 28th Street Omaha, Nebraska
Phone PLeasant 2575

Design for Fewer Posts

with Cantilevered Glulam Beams

180' x 100' bay of Mt. Rainier Ordnance Depot near Tacoma, Wash. Beams are spaced at 60', with cantilevered purlins spaced at 8', and covered with heavy tongue-and-groove sheathing. Design by Army Corps of Engineers; John H. Sellen Construction Co., Seattle, was the general contractor.



This warehouse shows how cantilevered beams and purlins lengthen normal spans and increase the size of open floor areas. Only four posts were used for 18,000 square feet of space.

Glulam beams require practically no jobsite assembly. Sidewalls are low, with no waste overhead space to heat and cool. Beams "stay put" without maintenance.

When combined with heavy timber decking and walls of concrete or masonry, glulam beams qualify for class II rating, with excellent fire resistivity and favorable fire insurance rates.

For information, see your nearest Timber Structures representative, or write for the booklet, "Engineering in Wood". Catalog also filed in Sweet's Architectural File.

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STRUCTURES
INCORPORATED

P. O. BOX 3782-C, PORTLAND 8, OREGON

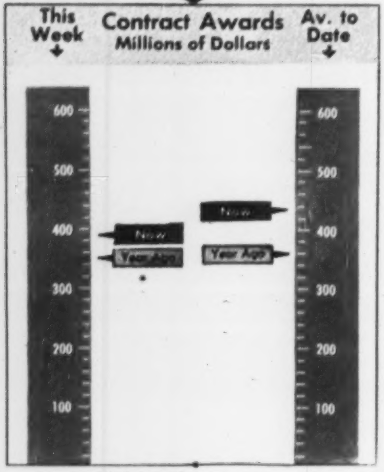
Offices in Ramsey, N. J.; Rochester, N. Y.; Boston; West Hartford; Cleveland; Charlotte; Chicago; Centerline, Mich.; Kansas City; Kirkwood, Mo.; Wichita; Minneapolis; Des Moines; Memphis; Dallas; Houston; Birmingham; Seattle; Spokane; Denver.

TIMBER STRUCTURES, INC. OF CALIFORNIA
Richmond • Beverly Hills • Sacramento

Local Representatives throughout the U. S. and Canada

Construction Scoreboard

Activity this Week



* 4-day week a year ago

AMOUNT OF CONTRACTS LET

By Ownership	This Week	Cum. 27 wks 1956	Chge %
	$ millions		
Federal	$52.7	$952.5	−2
State and Muncipal	145.7	3,415.5	+25
Total Public	198.4	4,368.0	+18
Total Private	191.4	7,385.1	+21
U. S. Total	$389.8	$11,753.1	+20
By Type of Work			
Waterworks	$6.9	$165.2	+20
Sewerage	11.5	319.6	+54
Bridges	16.8	335.3	+41
Highways	56.7	1,240.6	+13
Earthwork, Waterways	12.6	442.8	+45
Buildings:			
Public, Excl. Hosg.	56.9	1,071.1	+20
Public Housing	9.7	185.7	+25
Private Housing	73.2	3,093.0	−11
Commercial	29.0	990.2	+8
Industrial	82.0	2,919.0	+117
Unclassified	34.5	990.6	−1
U. S. Total	$389.8	$11,753.1	+20

NOTE: Minimum size projects included are: Waterworks and waterways, $44,000; other public works, $73,000; industrial buildings, $93,000; other buildings, $344,000.

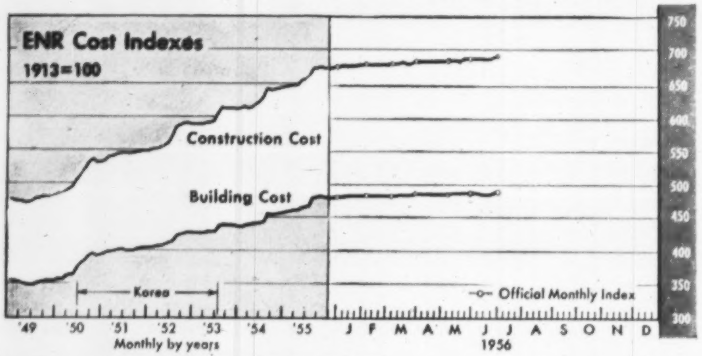
NEW CAPITAL FOR CONSTRUCTION

	Week of June 28	Cum. 26 wks 1956	Chge '55-'56 %
	$ millions		
Corporate Securities	$117.6	$2,248.2	+27
State and Municipal:			
All Except Housing	249.1	2,541.4	+14
Housing	...	41.2	−35
Federal Loans	...	78.5	+40
Federal Aid	...	905.0	+853
Total Nonfederal	$366.7	$5,814.0	+38
Federal Appropriations:			
In U. S.	$170.1	$252.7	+113
Outside U. S.	12.8	12.9	−4
Total New Capital	$549.5	$6,079.9	+40

Cost Indexes as of Now

ENR INDEXES (1913=100), 20-cities' average	Week of June 28, 1956	% Change from May 31, 1956	% Change from June 30, 1955
Construction Cost	694.75*	+0.4	+5.3
Building Cost	489.23*	+0.1	+4.6

*Official Monthly Index for July.
To convert above indexes to 1926 = 100: Divide Construction Cost by 2.030; Building Cost by 1.845.
1949 = 100: Divide Construction Cost by 4.770; Building Cost by 3.518.



WAGE RATES, 20-cities' average

	July 1956	% Change from June 1956	% Change from July 1955
Common	$2.187	+0.9	+5.5
Skilled (average 3 trades)	3.391	+0.7	+4.4
Bricklayers	3.675	+0.9	+4.9
Structural Ironworkers	3.352	+0.8	+3.9
Carpenters	3.145	+0.6	+4.5

MATERIAL PRICES, 20-cities' average

Structural Steel (average 3 mills), per cwt	$4.600	0	+8.2
Lumber, 2x4 Fir, per M fbm	120.583	−1.5	+0.2
Lumber, 2x4 Pine, per M fbm	103.533	−0.3	+4.2
Cement, bulk, per bbl	3.730	+0.5	+5.0
Sand, per ton	2.422	0	+2.8
Ready-mixed concrete, per cu yd	13.193	+0.3	+5.2

ENR INDEX REVIEW

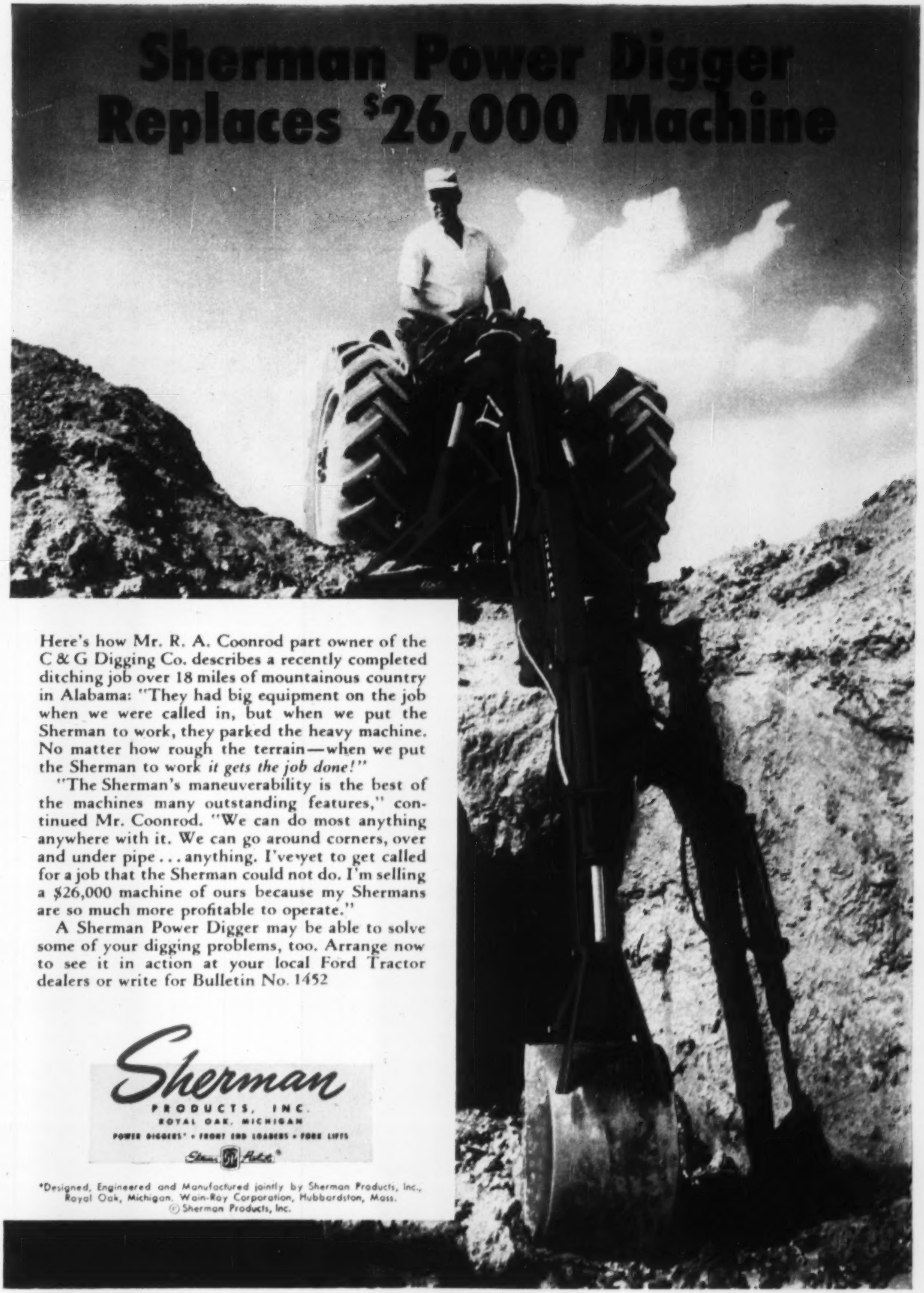
	Construction Cost 1913=100	Construction Cost 1949=100	Building Cost 1913=100	Building Cost 1949=100	Volume 1913=100	Volume 1949=100
1955						
July	660.09	138.38	467.52	132.90	699	202
Aug.	672.24	140.92	478.03	135.89	508	147
Sept.	672.74	141.03	479.15	136.20	576	166
Oct.	673.89	141.27	479.99	136.44	628	182
Nov.	673.20	141.13	479.30	136.25	561	162
Dec.	673.13	141.11	478.70	136.08	544	157
1955 Av.	**659.72**	**138.31**	**468.80**	**133.33**	**600**	**173**
1956						
Jan.	676.36	141.79	480.48	136.58	645	186
Feb.	680.21	142.59	483.08	137.32	736	213
Mar.	680.20	142.59	483.14	137.34	786	227
Apr.	683.28	143.24	485.56	138.02	764	221
May	688.43	144.32	487.36	138.54	684	198
June	692.13	145.09	488.70	138.92	636	184
July	694.75	145.64	489.23	139.07	...	...

MATERIAL SHORTAGES

- **Aluminum building sheets**—Shortage worsens in Boston where deliveries have risen to 130 days. Still short in Kansas City, St. Louis, Montreal, Toronto.
- **Structural steel**—Short in all key cities except Kansas City and St. Louis.
- **Reinforcing bars**—Short in Atlanta, Birmingham, Chicago, Denver, Detroit, Philadelphia, Montreal, Toronto.
- **Sheet piling steel**—Short in Atlanta, Chicago, Dallas, Denver, Detroit, Los Angeles, Minneapolis, Toronto.
- **Window glass**—Still short in Atlanta, Birmingham, Chicago, Cincinnati, Denver, Detroit, Kansas City, New Orleans, New York, Philadelphia, St. Louis, San Francisco, Seattle, Toronto.

For ENR cost indexes for preceding years see insert chart ENR Sept. 29, '55. Extra copies 50 cents.

Sherman Power Digger Replaces $26,000 Machine



Here's how Mr. R. A. Coonrod part owner of the C & G Digging Co. describes a recently completed ditching job over 18 miles of mountainous country in Alabama: "They had big equipment on the job when we were called in, but when we put the Sherman to work, they parked the heavy machine. No matter how rough the terrain—when we put the Sherman to work *it gets the job done!*"

"The Sherman's maneuverability is the best of the machines many outstanding features," continued Mr. Coonrod. "We can do most anything anywhere with it. We can go around corners, over and under pipe . . . anything. I've yet to get called for a job that the Sherman could not do. I'm selling a $26,000 machine of ours because my Shermans are so much more profitable to operate."

A Sherman Power Digger may be able to solve some of your digging problems, too. Arrange now to see it in action at your local Ford Tractor dealers or write for Bulletin No. 1452

Sherman
PRODUCTS, INC.
ROYAL OAK, MICHIGAN
POWER DIGGERS* • FRONT END LOADERS • FORK LIFTS

*Designed, Engineered and Manufactured jointly by Sherman Products, Inc., Royal Oak, Michigan. Wain-Roy Corporation, Hubbardston, Mass.
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only Knee High to a grass skirt

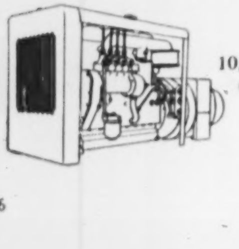
but head and shoulders above any other engine for

42 H.P. HEAVY-DUTY SERVICE

NEW Sheppard
MODEL 19 DIESEL
FITS INTO LESS SPACE THAN A 42 H.P. GAS ENGINE
26"
16"
45½"

Precision Engineering Features

• Full Pressure Lubrication • Gear Driven Camshaft • Oil-Cooled Pistons • Replaceable wet-type Cylinder Liners • 22 - to - 1 Compression Ratio • Standard SAE-5 Flywheel Housing • Counterbalanced Crankshaft • Famous Sheppard Simplified Fuel Injection System. • Main Bearings at each end of Crankshaft and between each Throw



Available as
10, 12 and 15 K. W.
Generating Sets

The low weight and compact size of the new Model 19 Sheppard Diesel make it the ideal original equipment or replacement power for your machines. A rugged 4-cylinder, 42 h.p., 4-cycle engine . . . the model 19 gives you the working muscle of full-diesel power . . . minus the fat. Sheppard engineers, with 20 years of specialized diesel experience to guide them, have succeeded in combining compact size . . . minumum weight and rugged dependability in a great new diesel that takes less installation space than a gasoline engine of equal rating. Get the facts on this great new Sheppard Diesel . . . write for complete information and specifications today.

FOR COMPLETE SPECIFICATIONS MAIL THIS COUPON NOW

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Send me complete information on the New Sheppard Model 19 Diesel Power Units....... Generating Sets.......
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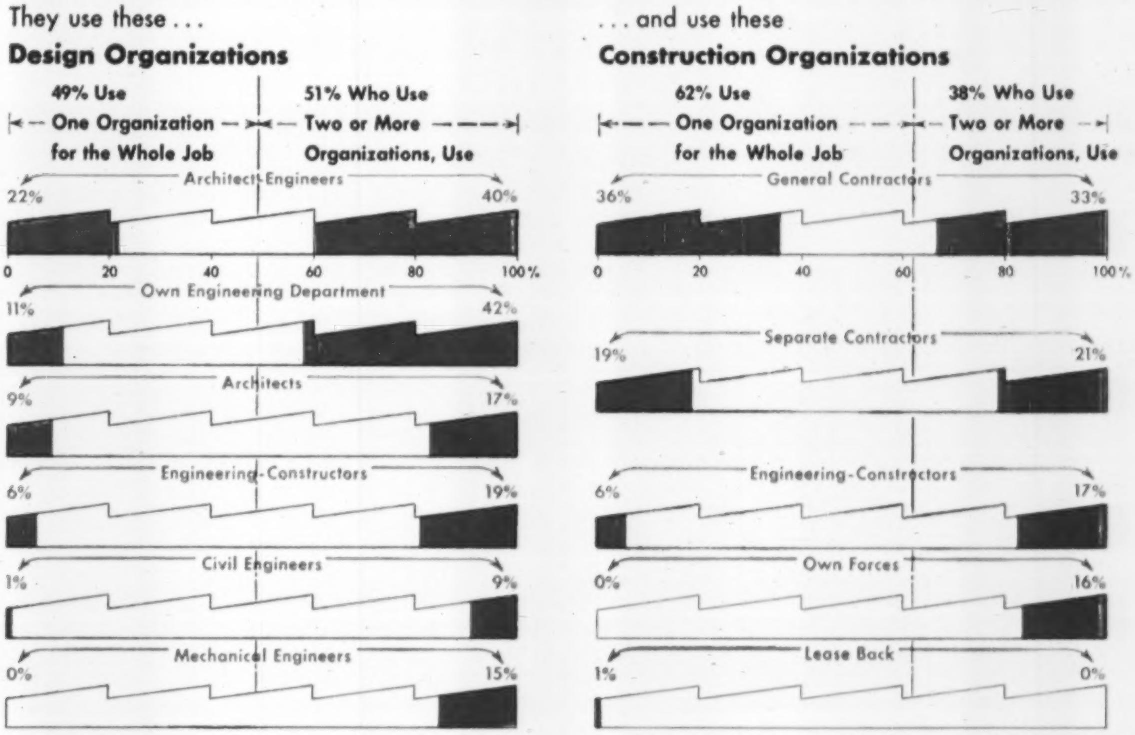
Business and Finance

How 81 Manufacturers Handle Design and Construction of New Plant



During 1955, 1,131 contractors took on 1,693 industrial contracts with a total value of $2.5 billion. This is based on awards reported by ENR and includes contractors who had $100,000 or more in total 1955 contracts for all types of work.

The chart above shows how industry calls on different design and construction organizations to handle its plant construction. For more details see page 44 of Special Report on Industrial Building.

Lump sum competitive bids outrank other contract forms for industrial plant construction. The negotiated guaranteed price contract is runnerup in popularity, closely followed by negotiated cost-plus and fixed-fee forms. Though half stick to one type of contract, the other firms choose different kinds in different situations.

How these stack up is shown in the table below.

	Number & Percent of Firms Using . . .			
	Only 1 Type Of Contract		2 or More Including	
Type of Construction Contract	No.	%	No.	%
Competitive bids, lump sum	24	30	25	31
Negotiated, guaranteed price	5	6	19	23
Negotiated, cost-plus	5	6	15	19
Negotiated, fixed-fee	5	6	14	17
Competitive bids, lump sum & escalation	2	2	5	6
Negotiated, lump sum & escalation	0	0	3	4
Cost reducing incentive	0	0	3	4

New Plants Help Lower Production Costs

Industry is going ahead with a record plant expansion not only because it needs more capacity, but to cut or hold down unit costs by designing greater productivity per sq ft and per dollar invested in new plants.

An ENR survey of a cross-section of industry shows that the number of industrial firms which will get more production per sq ft from new plant outnumber by five-to-one those which expect no gain. Similarly, firms getting more output per dollar invested in new plant outnumber by better than three-to-one those which will get no greater output.

What effect will the cost of new plants have on product prices? Three out of four firms claim there'll be no change in prices attributable to plant construction costs. Some expect their new, more productive plants will help them hold their market position by helping hold the price line.

Lower unit costs due to more productive plant will bring lower prices, say 10% of the firms reporting to ENR. Furthermore, nearly 7% more see some prices coming down though other items may rise. Only about 7% of the companies expect product prices to rise due to construction costs.

How much of the new plant cost is for construction as compared to production machinery? The ratio of structures and service equipment to production machinery varies from a high of 100-0 down to 10-90 for the 70 firms reporting, because of the diversified list of industries covered.

Of the firms reporting, 41% install only built-in production machinery, 48% use movable machines only and 11% use both. How does use of built-in production machinery affect ratios of structures and service equipment cost to production machinery costs? Firms using built-in machines are concentrated at the high and low extremes of the ratio scale. For instance, 27% have a 90-10 or higher ratio of construction to machinery cost. The percentage of firms drops to 20% for those in the 85-15 to 55-45 range; then to 17% in the 50-50 bracket. But 36% spend less than half of total plant cost for structures and service equipment. By contrast, most firms using movable machines are in the middle range of ratios: 20% with a 90-10 or greater ratio; 31% between 85-15 and 55-45; 26% with a 50-50 ratio; 23% spend less than half of total plant outlay for structures and service equipment.

(B&F continued on page 178)

Contract volume dips again but . . .

June Awards Set Record

Heavy construction contracts have set a new record of $1.6 billion for the month of June, a gain of 8% over the same month last year. The only sour note was a slip of 4% under the May awards, marking June as the third consecutive monthly decline.

Still, contract awards to date are running 21% ahead of last year's record high making the boom as potent as ever with $11.3 billion awarded since the first of the year.

A decline of 13% from the May figures for private construction is more than offset when the June figure is added to the total for this year which shows a gain of 22% over the same period last year.

Public construction awards for the month continue their seasonal rise, boosting the total to $726 million, a gain of 9% over the May figure and 17% above the same month last year.

Private housing awards in June pulled out of a slump to gain 6% over last month's total. This month, which had two $100-million weeks, was still 20% less than the housing awards of June '55. So far this year housing is off 11% of the record year of 1955.

Industrial buildings, which fell off 33% from its pace setting record in May, is still ahead of its June '55 rate by 80%. With more than $2.8 billion in awards for the first six months of this year, industrial buildings is 126% ahead of the same period last year.

A big leader this month was earthwork and waterways which saw a jump of 118% over the May awards to a new monthly record of $136 million, bringing the total for the first six months to 56% of the same period last year.

Although commercial building had set a record for the month of May, it reversed itself during June and dropped 12% below the May figure for a monthly total of $119 million.

Highway contracts, which had set a record in May, slipped 10% in June and were 14% below June 1955.

To date, every region is ahead of the 1955 comparable period. In three regions, the Middle Atlantic crossed the $3-billion mark; and the Middle West, and West of the Mississippi were put well on their way over the $2-billion mark for contracts awarded.

The Middle Atlantic region was the leader with June awards amounting to $347.7 million of which more than 66% were in the private construction field.

The Midwest, West of the Mississippi, and Far West ran up more than $300 million each in contracts for June. In two of these regions—West of the Mississippi and Midwest—industrial buildings and mass housings boosted the total. In the Far West earthworks and waterways was the leading factor.

Costs Pushed to a New High By Wages and Cement Prices

Higher cement prices and wages offset lumber price declines and pushed construction costs to record highs in July, as measured by ENR's 20-cities cost indexes. The Construction Cost Index climbs three points to 694.75, while the Building Cost Index is up one-half point over June to 489.23.

This brings the seven-months rise in '56 to 3.2% for the Construction Cost Index climbs three points to 694.75, a year ago. The Building Cost Index is up 2.2% so far in '56 and it is 4.6% above a year ago.

Scattered cement price hikes come in some southern, midwestern and far western cities. Most reflect mill price increases for the third quarter.

The housing slump has caused lumber prices, especially Douglas fir, to soften for the second consecutive month.

Settlement of wage bargaining in the steel industry will bring a further substantial cost rise. And a sizable increase in structural steel prices is expected to push the Construction Cost Index above the 700 mark and the Building Cost Index past the 500 mark.

Engineering Construction Contracts June 1956

ENGINEERING NEWS-RECORD *reports continental U. S. Construction projects of the following minimum costs—Waterworks, excavation, drainage and irrigation, $44,000; other public works, $73,000; industrial buildings, $93,000; other buildings, $344,000*

Four Weeks—Thousands of Dollars (000 Omitted)

	June, 1956							U. S Cumulative Six Months		%	Canada
	New England	**Middle Atlantic**	**South**	**Mid-West**	**West of Mississippi**	**Far West**	**Total U. S.**	**1956**	**1955**	**Change '55 to '56**	**June 1956**
Public Works											
Waterworks	548	1,151	2,788	4,369	12,525	11,326	**32,707**	**158,378**	128,844	+23	3,653
Sewerage	1,589	3,826	9,631	10,168	7,219	2,287	**34,720**	**308,198**	200,914	+53	2,407
Bridges	4,196	6,135	44,480	6,291	9,058	10,449	**80,609**	**315,854**	229,824	+38	3,089
Earthwork and waterways	416	2,482	7,411	469	9,985	116,069	**136,832**	**430,243**	276,109	+56	23,000
Streets and roads	9,589	27,920	19,679	35,861	65,350	27,912	**186,311**	**1,183,782**	1,063,497	+11	29,447
Public buildings, residential	....	....	3,048	863	4,111	....	**8,022**	**175,915**	138,794	+27	9,706
Other public buildings	8,706	30,854	32,371	50,878	25,428	22,814	**171,051**	**1,014,245**	839,583	+21	5,739
Unclassified	5,653	10,000	18,684	11,632	10,008	19,523	**75,500**	**583,044**	641,010	−9	3,744
Total public	**30,697**	**82,368**	**138,092**	**120,531**	**143,684**	**210,380**	725,752	**4,169,659**	**3,518,575**	**+19**	**80,785**
Federal government (included in above classifications)	4,999	**17,345**	39,633	11,961	16,917	37,762	**128,617**	**899,871**	893,412	+1	16,863
Private											
Bridges	....	....	....	....	....	....	....	**2,679**	1,625	+65	....
Industrial buildings	46,447	48,815	70,070	84,784	49,221	18,976	**318,313**	**2,837,028**	1,254,446	+126	68,969
Mass housing	16,478	172,158	13,680	81,662	83,384	26,969	**394,331**	**3,019,811**	3,405,585	−11	15,841
Commercial buildings	7,967	44,028	7,789	31,522	21,112	6,783	**119,201**	**961,267**	894,292	+7	24,379
Unclassified	500	350	1,604	1,074	13,613	46,842	**63,983**	**372,869**	349,618	+7	77,362
Total private	**71,392**	**265,351**	**93,143**	**199,042**	**167,330**	**99,570**	**895,828**	**7,193,654**	**5,905,566**	+22	**186,551**
Total Engineering Construction:											
June, 1956—4 weeks	**102,089**	**347,719**	**231,235**	**319,573**	**311,014**	**309,950**	**1,621,580**	....	....	....	**267,336**
May, 1956—5 weeks	95,568	582,021	203,993	534,631	369,868	333,689	**2,119,770**	....	....	....	183,385
June, 1955—5 weeks	95,019	544,395	168,568	358,096	482,599	232,867	**1,881,544**	....	....	....	209,557
Six Months—1956	**645,337**	**3,136,375**	**1,149,114**	**2,343,608**	**2,413,976**	**1,674,903**	....	**11,363,313**	....	+21	**1,077,711**
Six Months—1955	469,864	2,792,218	982,721	1,989,162	2,134,965	1,055,211	....	....	9,424,141	....	851,415
% Change '55 to '56	+37	+13	+17	+18	+13	+59	....	....	....	....	+27

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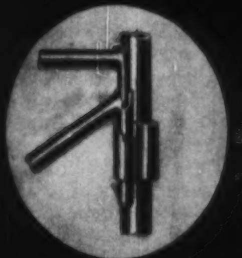

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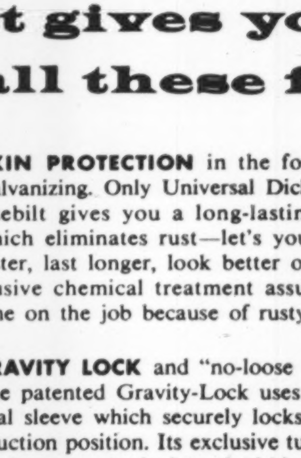

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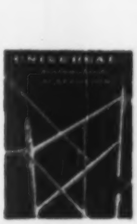

Contractors and labor view with hopeful optimism . . .

The Davis-Bacon Highway Compromise

Prevailing wages have been tossed into the field of highway construction on a scale as broad and far-reaching as the new federal highway program itself.

For the first time in history, the federal government has assumed the role of fixing wage rates for federally-assisted highway work contracted for by state agencies. Although the federal-aid Highway Act of 1956 extends Davis-Bacon prevailing wage determinations only to projects forming part of the interstate highway system (see story on page 23), the provision has the potential of affecting labor costs on all types of construction.

To contractors who have been close to the highway bill, that potential shapes up like this:

- Because of practical considerations and the laws of supply and demand, the Davis-Bacon provision will tend to pull work on the secondary and urban systems—as well as work on the balance of the primary system—into its orbit, establishing relatively uniform rates for all highway construction in any given area.
- Its greatest impact will be in rural and nonunion areas, and its ultimate effect on construction costs—both highway and building—will depend primarily on the care and skill with which it's administered. Use of the higher building instead of the lower highway rates coupled with (1) the importation of metropolitan or union rates into rural or nonunion areas and (2) unnecessary or erroneous classifications that curb flexibility in the use of manpower and precipitate labor disputes could boost highway construction costs at all levels from 15% to 40%.

Highway officials are about ready to launch the program with the letting of more than $100 million worth of contracts in the next two months but no serious delays are expected. In anticipation of Congressional approval of the wage provision, the U. S. Department of Labor has set in motion a vast expansion of its data collection facilities and fully expects to keep abreast of incoming wage requests. Highway contractors, already working at record levels, are confident of their ability to get and train the necessary workers, estimated to reach a monthly average of 450,000 by 1960–150,000 more than now. And although some will feel the pinch of the Davis-Bacon apprentice provisions, the operating engineers—one of the key trades—have recently adopted a formal, statewide apprenticeship program in Arizona in cooperation with AGC highway contractors, and the international union has urged other affiliates to consider similar action.

• The law—Under the complicated formula which Congress revised, the Secretary of Labor, who hasn't formulated any new policies, will proceed with wage determinations in accordance with previously established Davis-Bacon procedures. Predetermination consultations will be held with state highway departments, which will continue as in the past to certify minimum wage rates under existing regulations of the Bureau of Public Roads for all phases of the highway program other than the new 41,000 mi of interstate system. Wages federally determined will be applied, as the law directs, by the Secretary of Commerce.

• The theory—It sounds pretty simple—until you take a closer look. In theory, the prevailing wage principle is a protective device to prevent exploitation of labor by payment of substandard wages, which in turn depress local wage structures and disrupt local economies. It's not a gimmick for boosting wages. (Last year, the AGC's average hourly pay for highway workers was $2.54). All it means is that a government, entering a labor market as a purchaser, can go into a community, complete a public works program, and leave behind it economic conditions substantially similar to those existing before because it has paid the rates customarily received by local labor. Thus local workers and local contractors stand as good a chance as any of getting available work, and cash register receipts of local merchants are protected against the threat of local unemployment.

As a practical matter, the device imposes a minimum rate or wage floor as beneficial to union contractors as it is to labor itself. In many areas, because of unionization and collective bargaining, or because labor demand exceeds sup-

(*Continued on page 182*)

Davis-Bacon Act

Statute: ". . . The advertised specifications for every contract in excess of $2,000, to which the United States or the District of Columbia is a party, for construction, alteration, and/or repair, including painting and decorating, of public buildings or public works of the United States or the District of Columbia . . . and which requires or involves the employment of mechanics and/or laborers shall contain a provision stating the minimum wages to be paid various classes of laborers and mechanics which shall be based upon the wages that will be determined by the Secretary of Labor to be prevailing for the corresponding classes of laborers and mechanics employed on projects of a character similar to the contract work in the city, town, village, or other subdivision of the state in which the work is to be performed. . . ."

Regulations: "Sec. 1.2 Rule of Decision. In making any such predetermination the rate of wages which the Secretary will regard as prevailing shall be:

(a) The rate of wages paid in the city, town, village, or other civil division of the state (hereinafter referred to as the locality) in which the work is to be performed, to the majority of those employed in the corresponding classes of laborers or mechanics . . . on projects that are similar to the contract work; or

(b) In the event that there is not a majority paid at the same rate, then the rate paid to the greater number: Provided, such greater number constitutes 30% of those so employed; or

(c) In the event that less than 30% of those so employed receive the same rate, then the average rate."

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ply, contractors pay well above the legally determined prevailing wage. Critical factors in applying the principle are use of proper classifications and of the right rates for the right jobs—an almost impossible task in areas that have never experienced the type of construction for which the wages are to be determined.

Starting with the Davis-Bacon Act, initiated by a Republican administration, an elaborate system of wage determinations by labor classifications has evolved at the federal level. In addition to work directly contracted by the federal government and caught by the Davis-Bacon Act, various other forms of federally-assisted construction have been brought within the law from time to time.

On the state level, a variety of wage requirements for local public works programs has been imposed, but these laws are as heterogeneous as state liquor laws. Seventeen states impose no restrictions, and the requirements in the remaining states range from unrealistic minimums covering non-uniform geographical areas to pervailing wages correlated with or similar to Davis-Bacon determinations.

Under the federal-aid Road Act of 1916, the primary and secondary road system, administered by the Bureau of Public Roads (Department of Commerce) in cooperation with state highway departments, is tied into the state wage systems. For the purposes of that program, the bureau requires determination of minimum rates (by the three classifications of skilled, intermediate and unskilled) by the local state highway department—which sets the rate itself or uses the state's prevailing wage machinery, where available.

The Highway Law

"Sec. 115 (a) Application of Davis-Bacon Act.—The Secretary of Commerce shall take such action as may be necessary to insure that all laborers and mechanics employed by contractors or subcontractors on the initial construction work performed on highway projects on the interstate system . . . shall be paid wages at rates not less than those prevailing on the same type of work on similar construction in the immediate locality as determined by the Secretary of Labor in accordance with . . . the Davis-Bacon Act. . . .

(b) Consultation with state highway departments; predetermination of rates.—In carrying out the duties of the foregoing subsection, the Secretary of Labor shall consult with the Highway Department of the state in which a project on the interstate system is to be performed. After giving due regard to the information thus obtained, he shall make a predetermination of the minimum wages to be paid . . . which shall be set out in each project advertisement for bids and in each bid proposal form and shall be made a part of the contract covering the projects."

• **Federal approach**—Under the federal procedure, rates are set by classifications within the different crafts and one determination often embraces a multiplicity of separate rates. Last year, the Labor Department, through the wage determination division of its office of the solicitor in Washington, turned out 23,000 determinations, only 291 of which were for highways, using as a basis data collected in the field from various sources, including contractors and unions. The new highway program is expected to add 6,000-10,000 more determinations a year.

The Secretary of Labor has established his own guides as to what is "prevailing" within the geographical limitations imposed by law and disregards wage data from projects over a year old. He holds hearings when necessary, determines wages within 30 days after getting the request and requires his determinations to be used within 90 days after issued, or be redetermined. His actions are subject to departmental review but not judicial appeal, and mistakes can be adjusted under the procedure of "inadvertence". Administration and enforcement of all Davis-Bacon laws is coordinated under Regulation Part 5, adopted under Reorganization Plan 14 (Hoover Commission) of 1950.

• **Congress' dilemma**—When Congress began to probe into the wage aspects of the highway bill, the basic controversy developed over how construction workers should be protected wagewise, not whether they should be protected.

To such organizations as Associated General Contractors, American Road Builders and American State Highway Officials, it looked like a problem that should be—and could best be—solved at the state level where the contracts will be awarded and where it's been handled in the past. And they wanted to avoid some of the headaches of the federal procedure, in which, they claimed, the chances of wrong determinations, misclassifications, red-tape and confusion are greater.

The unions, including the carpenters, operating engineers, laborers and teamsters in particular, bucked for the federal system, which, they argued, has been doing a respectable job for 20 years. Wary of the spotty—and to them inadequate—state system, they also felt that the 90-10 basis of contribution for the interstate system effectively made the federal government the employer, rendering the problem a federal rather than a state one.

Faced with a debate over principles vs. percentages, Congress applied Davis-Bacon to the interstate system only, leaving the balance subject to the existing Bureau of Public Roads-state highway procedures. And after knocking out the Fulbright Amendment for judicial review, it threw in the Secretary of Commerce and state highway departments as curbs on the Secretary of Labor.

• **Some problems**—But in reaching its compromise, Congress indulged in some new phraseology such as "initial construction" and "immediate locality" that may stir new debates. It used the words "due regard" without saying whether Weeks could throw Mitchell's determinations out if he disagreed with them—and in the past the two secretaries have not seen eye-to-eye on many things. It speaks in terms of Davis-Bacon determinations, but doesn't say whether the rest of the act, from investigations to payment suspensions and blacklistings, apply.

From the floor of Congress and from committee members who considered the bill have come indications that the wage provisions are not applicable to the production of materials, such as sand and gravel; that they apply to construction and not to maintenance and repair; that the geographical limitations of the Davis-Bacon Act have been narrowed, or at least not enlarged; and that Regulation 5 will apply.

How it will work out remains to be seen. Meanwhile, contractors and labor, generally, are hopefully optimistic. Labor got about all it could expect, contractors have a law they think they "can live with."

Under Road Act of 1916

"Sec. 1.12 (b) The selection of labor to be employed on any work undertaken under the act in each state shall be in conformity with the laws of such state.

"(c) To prevent the exploitation of labor all contracts shall prescribe the minimum rate of wages for skilled, intermediate, and unskilled labor, as predetermined by the State Highway Department, and such minimum rates shall be stated in the specifications advertised in the call for bids. . . ."

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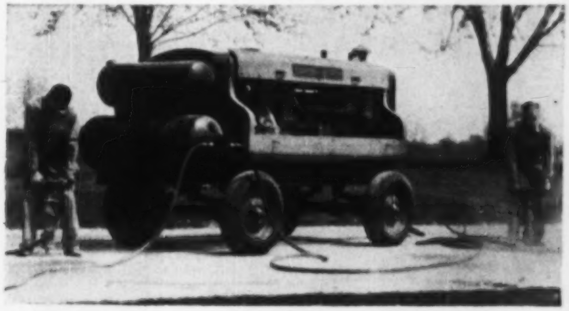
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OFFICIAL PROPOSALS

Bids: July 26, 1956

New York State Road Work

NOTICE TO CONTRACTORS: STATE DEPARTMENT OF PUBLIC WORKS, ALBANY, N. Y.—Pursuant to the provisions of the Highway Law, and special provisions for projects financed with Federal Aid Funds, sealed proposals will be received until ten-thirty o'clock A. M., advanced standard time, which is nine-thirty o'clock A. M., eastern standard time, on the 26th day of July 1956, by Henry A. Cohen, Director, Bureau of Contracts and Accounts, 14th Floor, The Governor Alfred E. Smith State Office Building, Albany, N. Y., for the following projects:

County	Contract No.	Name	Miles	Type	Deposit	Estimated Cost of Work
DISTRICT No. 2, Lacy Ketchum, District Engineer, 109 No. Genesee St., Utica, N. Y.						
Fulton (Rte. 148)	FARC 56-52	Gloversville-Mayfield, S.H. 33 Project U-F-419(7)	2.43	Asp. Conc., Opt.	$23,000 Plans $15	$416,000
DISTRICT No. 5, E. G. H. Youngmann, District Engineer, 65 Court St., Buffalo, N. Y.						
Niagara (Rte. 31)	FATC 56-2	City of Lockport: Genesee St. & Walnut St. FAC 52-11, FAC 54-10 Project U-709(6)	1.21	Traffic Signal System	$2,200 Plans $10	41,000
DISTRICT No. 6, J. H. Thomas, District Engineer, 30 W. Main St., Hornell, N. Y.						
Steuben (Rte. 15)	FARC 56-49	Painted Post-Campbell, S.H. 5211 Campbell-Bath, S.H. 5224 Project F-225(10)	4.30	Asp. Conc., Opt.	$20,000 Plans $10	363,000
Steuben (Rte. 36)	FARC 56-50	Arkport-Dansville, S.H. 5352-B & 5352 Project F-579(4)	3.41	Asp. Conc., Opt.	$12,000 Plans $10	225,000
Steuben (Rte. 17 & 36)	FARC 56-51	Troupsburg Center-Jasper, Pt. 2, S.H. 8154 Canisteo-Jasper, S.H. 5348-B and Jasper-Addison, S.H. 5253E Project F-442(6); F-1115(1)	3.15	Asp. Conc., Opt.	$12,000 Plans $10	203,000
DISTRICT No. 7, R. W. Sweet, District Engineer, 444 Van Duzee St., Watertown, N. Y.						
St. Lawrence (Rte. 37)	FATC 56-1	Massena South Side Route, Pt. 1, FASH 56-13 (37-2-27) Massena South Side Route, Pt. 2, FASH 55-7 Massena-Helena, Pt. 1, S.H. 1261 Project U-580(11)	5.13	Traffic Signal System	$3,500 Plans $10	64,000
St. Lawrence (Rte. 37B)	FASSH 56-4	Village of Massena: Center St.-Parker St. Bridge & Interchange (37-2-27.8) Project US-467(1)	0.64 (0.60) (Acc.)	Asp. Conc., Opt. Bridge Welded Plate Girder 840′	$110,000 Plans $25	2,060,000
DISTRICT No. 8, K. G. Rauer, Acting District Engineer, Pleasant Valley Road, Poughkeepsie, N. Y.						
Dutchess	BA 56-2P	East Approach: Kingston-Rhinecliff Bridge (Cont. 8)	1.35	9″ Cem. Conc. Pavt. 24′-36′ Wide = 1.14 Mi. Asp. Conc. Opt. = 0.21 Mi.	$9,000 Plans $10	175,000
Rockland (Rte. 9W)	RC 56-27	Tompkins Cove-West Haverstraw, S.H. 8049	0.18	Cem. Conc. Sidewalks & Curbs	$700 Plans $10	13,000
Ulster	BA 56-1P	West Approach: Kingston-Rhinecliff Bridge (Cont. 6)	0.31	9″ Cem. Conc. Pavt. 36′-68′ Wide	$5,600 Plans $10	102,000
DISTRICT No. 9, J. C. Federick, District Engineer, 71 Frederick Street, Binghamton, N. Y.						
Broome (Rte. 17)	FARC 56-48	Windsor-Deposit, S.H. 5338 Project F-344(21)	5.80	Asp. Conc., Opt.	$20,000 Plans $10	364,000
DISTRICT No. 10, M. E. Goul, District Engineer, 325 W. Main Street, Babylon, L. I., N. Y.						
Bronx	FAMDE 56-1	Major Deegan Expressway & Extension Cont. 18 Project U-1082(22)	7.33	Landscaping and Misc. Work	$20,000 Plans $15	360,000
Kings	FAPE 56-1	Prospect Expressway Cont. 3A Project U-1081(2)	0.78 (1.63) (Acc.)	9″ Cem. Conc. Pavt. 2 @ 36′ Var. Wide = 1.13 Mi. Sheet Asph. Pavt. = 1.15 Mi. Misc. Work = 0.13 Mi. 3 Hwy. Seps. Steel Girders 114.7′, 107.6′, & 135.5′ 1 Ped. Overpass Steel Girder 159.7′	$310,000 Plans $100	5,536,000

Maps, plans, specifications and proposal forms may be seen and obtained at the office of the State Department of Public Works, Bureau of Contracts and Accounts, Albany, N. Y., and at the office of the District Engineers noted above, and may also be seen at the office of the State Department of Public Works, 270 Broadway, New York City.

The deposit for Plans and Proposal Forms for each contract is indicated above. A refund will be made in full to bidders for return of one set, in good condition, within 30 days of award, or rejection of bids; refund for all other sets in good condition, similar period, will be 50% of deposit.

Special attention of bidders is called to "General Information for Bidders" in the proposal, specification, and contract agreement, and to the special provisions applying to projects financed with federal funds. Award of a contract is subject to priorities and allocations under the Defense Production Act of 1950, as amended, and all regulations issued thereunder.

Proposal for each contract must be submitted in a separate sealed envelope with the name and number of the contract plainly endorsed on the outside of the envelope. Each proposal must be accompanied by draft or certified check payable to the order of the "State of New York, Commissioner of Taxation and Finance" for the sum as specified in the advertisement and the proposal. The retention and disposal of the bidding check, the execution of the contract and bonds shall conform to the provisions of the Highway Laws, as set forth in "Instructions to Bidders".

The right is reserved to reject any or all bids.

JOHN W. JOHNSON
SUPT. OF PUBLIC WORKS

Bids: August 7, 1956

Contract NA-370.001

ADVERTISEMENT
THE PORT OF NEW YORK AUTHORITY
NEWARK AIRPORT
PASSENGER TERMINAL
ARCADE EXTENSIONS

Sealed proposals for the construction of extensions to the east and west passenger arcades for the Passenger Terminal at Newark Airport, Newark, N. J., will be received at the office of the Chief Engineer of The Port of New York Authority, Room 1100, 111 Eighth Avenue, New York 11, N. Y., until 2:30 P.M. on Tuesday, August 7, 1956, at which time said proposals will be opened and read in Room 1108.

Contract documents may be seen at the office of the Engineer of Design of the Authority, Room 1112. Documents will be furnished upon deposit of $30.00 per set for not more than three sets to any one company (each set including one copy of the contract drawings). Additional sets will be furnished upon payment of $30.00 per set, which payment is not returnable. Deposits and payments shall be delivered to the Treasury Department, Room 1001, where a receipt in duplicate will be issued. A copy of the receipt shall be delivered to Room 1112, where the documents will be furnished.

Those who have submitted a bid on the contract will receive a refund of the deposit for each set of documents, not exceeding three, returned within forty days after the opening of proposals. Those who have not submitted a bid will receive a refund of one-half of the deposit for each set of documents, not exceeding three, returned within forty days after the opening of proposals.

THE PORT OF NEW YORK AUTHORITY
Donald V. Lowe, Chairman
New York, July 5, 1956

DEPARTMENT OF THE INTERIOR, Bureau of Reclamation. Sealed bids (Specifications No. DC-4721) will be received at Rupert, Idaho, until August 2, 1956, for furnishing labor and materials for Earthwork and Structures, Main Canal West-Michaud Flats Project, Idaho. Location near American Falls, Power County, Idaho. Principal items are 115,000 cu. yds. excavation; 325 cu. yds. concrete; 6,000 lin. ft. standard strength culvert and pressure pipe; and other work. Completion time 400 days. For particulars, address Bureau of Reclamation, Rupert, Idaho; or Building 53, Denver Federal Center, Denver 2, Colorado. W. A. Dexheimer, Commissioner.

OFFICIAL PROPOSALS

Bids: August 15, 1956

Republic of Liberia

DEPARTMENT OF PUBLIC WORKS AND UTILITIES
DIVISION OF HIGHWAYS
MONROVIA
STANDARD GOVERNMENT FORM OF INVITATION FOR BIDS
FORM NO. 20

SEALED BIDS, in single copy only, subject to the conditions contained herein, will be received until 11 o'clock A.M., Monrovia time, on the 15th day of August 1956, and then publicly opened at that time, at the office of the Secretary of the Department of Public Works and Utilities, for furnishing the materials and performing the work for constructing the Liberia, Gbarnga—Kailahun Projects SH 1-B(2), SH 1-C, SH 1-D and SH 1-E. Telegraphic bids will not be accepted. Bids received after the above time and date will not be considered. The combined length of the Projects is approximately 144.6 miles, and the items of work are approximately as follows:

Project SH 1-B(2)

Item No.	Item	Quantity	Unit
20(1)	Clearing and Grubbing	5	Acres
24(1)	Unclassified Excavation	22,000	Cu. Yds.
25(1)	Unclassified Excavation for Structures	325	Cu. Yds.
27(2)	Overhaul on Uncl. Excavation (1000' F.H.)	10,000	Sta. Yds.
28(2)	Overhaul on Select Borrow Surf. Crs. (1000' F.H.)	5,000	Cu. Yd. Mi.
30(1)	Foundation Fill	150	Cu. Yds.
37(1)	Furrow Ditches	1,000	Lin. Ft.
100(1)	Select Borrow Surface Course (Laterite)	1,600	Cu. Yds.
206(1)	Class "A" Concrete	845	Cu. Yds.
206(2)	Class "B" Concrete	60	Cu. Yds.
206A(5)	Class "Y" Concrete	16	Cu. Yds.
207(1)	Reinforcing Steel	167,000	Lbs.
220(1)	Structural Steel	213,000	Lbs.
249(1)	Concrete Block Masonry Headwalls	8	Cu. Yds.
250(3)	24" Standard Str. Reinf. Concrete Pipe	42	Lin. Ft.
250(4)	30" Standard Str. Reinf. Concrete Pipe	60	Lin. Ft.
250(5)	36" Standard Str. Reinf. Concrete Pipe	60	Lin. Ft.
255A(3)	24" Bituminous coated corr. sheet metal Culvert Pipe, Type 2, Nestable	42	Lin. Ft.
255A(4)	30" Bituminous coated corr. sheet metal Culvert Pipe, Type 2, Nestable	60	Lin. Ft.
255A(5)	36" Bituminous coated corr. sheet metal Culvert Pipe, Type 2, Nestable	60	Lin. Ft.
310(1)	Loose Rip Rap	800	Cu. Yds.
	Extra Work: Stone Ditch checks, planting grass, etc	Lump Sum	
	Project SH 1-C		
20(1)	Clearing and Grubbing	385	Acres
24(1)	Unclassified Excavation	940,000	Cu. Yds.
25(1)	Unclassified Excavation for Structures	8,500	Cu. Yds.
27(2)	Overhaul on Uncl. Excavation (1000' F.H.)	263,000	Sta. Yds.
28(2)	Overhaul on Select Borr. Surf. Crs. (1000' F.H.)	400,000	Cu. Yds. Mi.
30(1)	Foundation Fill	3,000	Cu. Yds.
37(1)	Furrow Ditches	62,500	Lin. Ft.
100(1)	Select Borrow Surface Course (Laterite)	143,000	Cu. Yds.
206(1)	Class "A" Concrete	4,500	Cu. Yds.
206(2)	Class "B" Concrete	90	Cu. Yds.
206A(5)	Class "Y" Concrete	10	Cu. Yds.
207(1)	Reinforcing Steel	510,000	Lbs.
249(1)	Concrete Block Masonry Headwalls	600	Cu. Yds.
250(1)	15" Standard Reinf. Conc. Pipe Culvert	480	Lin. Ft.
250(2)	18" Standard Reinf. Conc. Pipe Culvert	600	Lin. Ft.
250(3)	24" Standard Reinf. Conc. Pipe Culvert	1,104	Lin. Ft.
250(4)	30" Standard Reinf. Conc. Pipe Culvert	5,721	Lin. Ft.
250(5)	36" Standard Reinf. Conc. Pipe Culvert	2,649	Lin. Ft.
250(6)	48" Standard Reinf. Conc. Pipe Culvert	3,876	Lin. Ft.
250(7)	60" Standard Reinf. Conc. Pipe Culvert	162	Lin. Ft.
255A(1)	15" Bituminous coated Corr. Sheet Metal Culvert Pipe, Type 2, Nestable	480	Lin. Ft.
255A(2)	18" Bituminous coated Corr. Sheet Metal Culvert Pipe, Type 2, Nestable	600	Lin. Ft.
255A(3)	24" Bituminous coated Corr. Sheet Metal Culvert Pipe, Type 2, Nestable	1,104	Lin. Ft.
255A(4)	30" Bituminous coated Corr. Sheet Metal Culvert Pipe, Type 2, Nestable	5,721	Lin. Ft.
255A(5)	36" Bituminous coated Corr. Sheet Metal Culvert Pipe, Type 2, Nestable	2,649	Lin. Ft.
255A(6)	48" Bituminous coated Corr. Sheet Metal Culvert Pipe, Type 2, Nestable	3,876	Lin. Ft.
255A(7)	60" Bituminous coated Corr. Sheet Metal Culvert Pipe; Type 2, Nestable	162	Lin. Ft.
310(1)	"Loose Rip Rap"	700	Cu. Yds.
	Extra Work: Stone Ditch checks, Planting grass on Embankment Slopes, etc.	Lump Sum	
	Project SH 1-D		
20(1)	Clearing and Grubbing	400	Acres
24(1)	Unclassified Excavation	1,110,000	Cu. Yds.
25(1)	Unclassified Excavation for Structures	9,000	Cu. Yds.
27(2)	Overhaul on Uncl. Excav. (1000' F.H.)	260,000	Sta. Yds.
28(2)	Overhaul on Select Borrow Surf. Crs (1000' F.H.)	400,000	Cu. Yd. Mi.
30(1)	Foundation Fill	3,000	Cu. Yds.
37(1)	Furrow Ditches	62,000	Lin. Ft.
100(1)	Select Borrow Surface Course	143,000	Cu. Yds.
206(1)	Class "A" Concrete	4,050	Cu. Yds.
206(2)	Class "B" Concrete	200	Cu. Yds.
206A(5)	Class "Y" Concrete	35	Cu. Yds.
207(1)	Reinforcing Steel	566,000	Lbs.
249(1)	Concrete Block Masonry Headwalls	525	Cu. Yds.
250(1)	15" Standard Str. Reinf. Conc. Culvert Pipe	300	Lin. Ft.
250(2)	18" Standard Str. Reinf. Conc. Culvert Pipe	600	Lin. Ft.
250(3)	24" Standard Str. Reinf. Conc. Culvert Pipe	1,080	Lin. Ft.
250(4)	30" Standard Str. Reinf. Conc. Culvert Pipe	3,330	Lin. Ft.
250(5)	36" Standard Str. Reinf. Conc. Culvert Pipe	2,660	Lin. Ft.
250(6)	48" Standard Str. Reinf. Conc. Culvert Pipe	4,509	Lin. Ft.
255A(1)	15" Bituminous coated Corr. Sheet Metal Culvert Pipe, Type 2, Nestable	300	Lin. Ft.
255A(2)	18" Bituminous coated Corr. Sheet Metal Culvert Pipe, Type 2, Nestable	600	Lin. Ft.
255A(3)	24" Bituminous coated Corr. Sheet Metal Culvert Pipe, Type 2, Nestable	1,080	Lin. Ft.
255A(4)	30" Bituminous coated Corr. Sheet Metal Culvert Pipe, Type 2, Nestable	3,300	Lin. Ft.
255A(5)	36" Bituminous coated Corr. Sheet Metal Culvert Pipe, Type 2, Nestable	2,660	Lin. Ft.
255A(6)	48" Bituminous coated Corr. Sheet Metal Culvert Pipe, Type 2, Nestable	4,590	Lin. Ft.
310(1)	"Loose Rip Rap"	900	Cu. Yds.
	Extra Work: Stone Ditch checks, Planting grass on Embankment Slopes, etc.	Lump Sum	
	Special Provisions: Construct Ferry at Loffa River	Lump Sum	
	Project SH 1-E		
24(1)	Unclassified Excavation	1,200,000	Cu. Yds.
25(1)	Unclassified Excavation for Structures	9,500	Cu. Yds.
27(2)	Overhaul on Uncl. Excav. (1000' Free Haul)	263,000	Sta. Yds.
28(2)	Overhaul on Select Bor. Surf. Crs. (1000' F.H.)	400,000	Cu. Yd. Mi.
30(1)	Foundation Fill	3,500	Cu. Yds.
37(1)	Furrow Ditches	62,500	Lin. Ft.
100(1)	Select Borrow Surface Course	150,000	Cu. Yds.
206(1)	Class "A" Concrete	3,100	Cu. Yds.
206(2)	Class "B" Concrete	200	Cu. Yds.
206A(5)	Class "Y" Concrete	35	Cu. Yds.
207(1)	Reinforcing Steel	450,000	Lbs.
249(1)	Concrete Block Masonry Headwalls	600	Cu. Yds.
250(1)	15" Standard Str. Reinf. Conc. Pipe Culvert	480	Lin. Ft.
250(2)	18" Standard Str. Reinf. Conc. Pipe Culvert	600	Lin. Ft.
250(3)	24" Standard Str. Reinf. Conc. Pipe Culvert	1,100	Lin. Ft.
250(4)	30" Standard Str. Reinf. Conc. Pipe Culvert	5,175	Lin. Ft.
250(5)	36" Standard Str. Reinf. Conc. Pipe Culvert	2,800	Lin. Ft.
250(6)	48" Standard Str. Reinf. Conc. Pipe Culvert	4,600	Lin. Ft.
250(7)	60" Standard Str. Reinf. Conc. Pipe Culvert	150	Lin. Ft.
255A(1)	15" Bituminous Coated Corr. Sheet Metal Culvert Pipe, Type 2, Nestable	480	Lin. Ft.
255A(2)	18" Bituminous Coated Corr. Sheet Metal Culvert Pipe, Type 2, Nestable	600	Lin. Ft.
255A(3)	24" Bituminous Coated Corr. Sheet Metal Culvert Pipe, Type 2, Nestable	1,100	Lin. Ft.
255A(4)	30" Bituminous Coated Corr. Sheet Metal Culvert Pipe, Type 2, Nestable	5,175	Lin. Ft.
255A(5)	36" Bituminous Coated Corr. Sheet Metal Culvert Pipe, Type 2, Nestable	2,800	Lin. Ft.
255A(6)	48" Bituminous Coated Corr. Sheet Metal Culvert Pipe, Type 2, Nestable	4,600	Lin. Ft.
255A(7)	60" Bituminous Coated Corr. Sheet Metal Culvert Pipe, Type 2, Nestable	150	Lin. Ft.
310(1)	Loose Rip Rap	800	Cu. Yds.
	Extra Work: Stone Ditch checks, Planting grass on Embankment Slopes, etc	Lump Sum	

The Government will permit the contractor to import duty free, any supplies or materials incorporated in the work, or equipment used on the work. The contractor will furnish all equipment necessary for construction of the work and all materials and supplies incorporated in the work unless specific mention is made to the contrary in the Special Provisions or Invitation for Bids. Supplies or materials not of Liberia or United States origin or manufacture shall not be used on this project without the written consent of the Secretary of the Department of Public Works and Utilities.

Preference of employment in all categories shall be given to qualified Liberian and United States citizens, but only Liberian citizens may be employed as Unskilled Labor, except upon written permission of the Secretary of the Department of Public Works and Utilities. Only Bids from qualified Liberian or United States firms or entities presently incorporated in, or licensed to operate in, either country will be considered. Bidders' attention is called to Article 13 "Officials Not To Benefit"; Article 17, "Domestic Preference"; aid Article 22, "Preference of Employment", of the Contract and Proposal.

Competency of Bidders shall be indicated by the submission at the earliest possible date prior to submission of bids of the Attested Statements and Questionnaires prescribed in Article 2.6 of "Specifications FP-41". These forms will be furnished with the Proposals.

The plans, specifications, special provisions, and Pre-qualification Questionaires may be obtained at the Department of Public Works and Utilities, Office of the Chief Engineer, Monrovia, R. L., and will also be available for examination at the Liberian Embassy and the Bureau of Public Roads in Washington, D. C. U. S. A. When copies of plans and specifications are requested, a deposit of $100.00 (cash or certified check) will be required to insure their return. If these are not returned with in (15) fifteen days after opening of bids the deposit will be forfeited to the Government. Certified checks should be made upon a Monrovia Bank or reputable firm approved by the Secretary of the Department of Public Works and Utilities, and payable to the Bureau of Revenues, Republic of Liberia.

Performance of the contract shall begin within (60) sixty Calendar days after the date of the Notice to Proceed and the contract shall be completed within 720 calendar days, subject to such extensions as may be authorized by the terms of Article 8.6 of "Specifications FP-41". Contract time will begin (60) sixty days after the Notice to Proceed and will run concurrently on Projects SH 1-B(2), SH 1-C, and SH 1-D.

Notice to Proceed on Project SH 1-E shall be given within (60) sixty days of the estimated time of completion of grading plans, and contract time will begin (60) sixty days after the Notice to Proceed. Contract time for Project SH 1-E shall be 360 calendar days, subject to such extensions as may be authorized by the terms of Article 8.6 of "Specifications FP-41".

A Bid Bond, or cash, or negotiable check payable to the Republic of Liberia, in the amount of 5% of the amount of the bid must accompany the Bid, otherwise the Bid will not be considered. This security will be returned upon award to the contractor. Performance and payment Bonds, each in the amount of 20% of the Bid Amount will be required.

Liquidated damages for delay will be as set forth in Article 8.7 of "Specifications FP-41," as modified by the Special Provisions. Partial payments will be made as set forth in Article 9.6 of "Specifications FP-41." No partial payments will be made, however, when the amount due is less than $500.

The right is reserved, as the interests of the Government may require, to reject any and all bids, and to waive any informality in bids received.

Envelopes containing bids must be sealed, marked and addressed as follows:

BID FOR CONSTRUCTION
Liberia, Saint Paul River-Kailahun, Projects SH 1-B(2), SH 1-C
SH 1-D and SH 1-E.

The Honorable
The Secretary of Public Works and Utilities
Department of Public Works and Utilities
Monrovia, Liberia.

NOTE: See copies of Standard Government Instructions to Bidders, Standard Government Form of Contract, which are part of this Proposal and Contract.

In the interest of uniformity, bidders are required to complete the forms provided in the Proposal and Contract, or exact copies of them when submitting bids. These are: Bid Schedule; Bid (Construction Contract); Contract (Construction); Standard Government Form of Bid; Bid Bond (Construction or Supply); Performance Bond (Construction or Supply); and Payment Bond

Bids: July 26, 1956

City of Tampa, Florida

PUMPING AND EJECTOR STATIONS

Sealed proposals for construction of 4 Pumping and Ejector Stations, will be received at the regular meeting place of the Board of Representatives, City Hall, Tampa, Florida, until 2 P.M., E.S.T., July 26, 1956, there to be publicly opened and read aloud.

The work comprises construction of the following:

- Division XG25—West Shore Boulevard Pumping Station with two 300 GPM and two 800 GPM capacity vertical sewage pumps
- Division XG28—Neptune Way Ejector Station with one 300 GPM capacity duplex pneumatic sewage ejector

and the remodeling of the following existing stations:

- Division XG29—Dazzo Avenue Pumping Station with installation of two 400 GPM capacity vertical sewage pumps to be furnished by the City, and furnishing and installation of two similar 1,200 GPM capacity vertical sewage pumps
- Division XG30—Osborne Avenue Pumping Station with installation of two 300 GPM capacity vertical sewage pumps to be furnished by the City, and furnishing and installation of two similar 720 GPM capacity vertical sewage pumps

Plans and Contract Documents may be examined and obtained from the offices of the Bureau of Sanitary Sewers, 6th Floor, City Hall, Tampa, Florida, and from the offices of Greeley and Hansen, Engineers, 220 South State Street, Chicago 4, Illinois. A deposit of $25.00 is required for each set of contract documents covering the four divisions.

City of Tampa, Florida
By J. L. Young, Jr., Mayor
Dated June 27, 1956

Bids: August 14, 1956

Port of New Orleans

ADVERTISEMENT

Sealed bids will be received by the Board of Commissioners of the Port of New Orleans at their office, Room 204, No. 2 Canal Street, until Tuesday, August 14, 1956, at 2:00 o'clock P.M., and then publicly opened for furnishing approximately 1700 tons of steel sheet piles.

Deposit of three per cent of the sum bid, by certified check only, certified by an accredited officer of an accredited bank, is required with each bid.

A surety bond, in acceptable surety company, for fifty per cent of the amount of the contract, is required with notarial contract.

Specifications and bid forms are on file in the Board's office mentioned above. Complete sets will be furnished to prospective bidders on application.

The right is reserved to accept or reject any or all bids and to waive informalities, and to award a contract or contracts as the Board may determine to be for its best interests.

Bids: July 24, 1956

Contract No. 6

ADVERTISEMENT
NOTICE TO CONTRACTORS

Notice is hereby given that sealed bids or proposals in sealed plain wrapper bearing the appropriate identification "Bid for Water Treatment Plant Equipment, Contract No. 6", will be received by the Board of Water Commissioners at its office in the Town Hall, Town of Bethlehem, Delmar, New York at 7:30 P.M. Eastern Daylight Saving Time, on the 24th of July, 1956, and then will be publicly opened and read aloud at a meeting of said Board, to be held at such time and place.

The work includes furnishing and installing equipment for a 1.5 MGD filter plant including meters, controllers, piping, valves, operating tables, surface wash system, filter underdrains, clarifiers, pumping equipment, chlorinating equipment, and other appurtenant work.

Copies of the plans and specifications may be examined at the office of the Town Clerk of the Town of Bethlehem, New York, 393 Delaware Avenue, Delmar, New York, or at the office of the Engineers, Benjamin L. Smith & Associates, 11 North Pearl Street, Albany, New York; copies thereof may be purchased from the Board and/or Engineers upon payment of Twenty Dollars ($20.00) for each set of plans and specifications.

Proposals must be submitted on the blank forms provided and in a manner designated therein. Each proposal must be accompanied by a Bid Bond or certified check in an amount equal to Five Per Cent (5%) of the Total bid. The Bid Bonds or Certified Checks of all but the three lowest bidders will be returned within ten days after the opening of bids, while the remaining bonds or checks will be returned as soon as a contract has been executed. The Bid Bond or Certified Check of the successful bidder will be retained to pay any loss of damage to Water District No. 1 and/or Town of Bethlehem, in the event said successful bidder shall refuse or neglect to enter into a contract in accordance with this proposal. Acceptance of the bid will be contingent upon the fulfillment of this requirement by each bidder.

The Board of Water Commissioners reserves the right to consider bids for a period of Forty-Five Days after their opening, and the right is reserved to reject all bids.

BOARD OF WATER COMMISSIONERS,
WATER DISTRICT NO. 1
TOWN OF BETHLEHEM, NEW YORK
BY: Harold C. Barkhuff, Chairman

Bids: July 24, 1956

Power Authority of the State of New York

ADVERTISEMENT FOR PROPOSALS
FOR
RESERVOIR CLEARING
BETWEEN
POINT THREE POINTS AND RED
MILLS POINT NEAR WADDINGTON,
ST. LAWRENCE COUNTY, NEW YORK
SPECIFICATION NO. PA-5-11020
ST. LAWRENCE CONTRACT NO. 28

NOTICE TO CONTRACTORS: The POWER AUTHORITY OF THE STATE OF NEW YORK will receive sealed proposals for the Reservoir Clearing between Point Three Points and Red Mills Point near Waddington, St. Lawrence County, New York in the following ways:

(1) If brought in person on the day of receiving bids until 10:30 A.M. Eastern Daylight Saving Time on the 24th day of July, 1956, 270 Broadway, Hearing Room C on the 6th floor, New York, New York.

(2) If mailed in until 10:15 A.M. Eastern Daylight Saving Time on the 24th day of July, 1956, at the Authority's office, 270 Broadway, Room 1300, New York 7, New York.

The proposals will be publicly opened and read aloud at the time and at the address given in (1) above.

The work consists of approximately 140 acres of clearing.

The work shall be completed on or before December 1, 1956.

Plans, specifications and Proposal Forms for the work will be on file in the Authority's office and in the offices of the Engineer, Uhl, Hall & Rich, 230 Congress Street, Boston 10, Massachusetts, and The Hydro-Electric Power Commission of Ontario, 620 University Avenue, Toronto 2, Ontario, may be inspected by prospective bidders during office hours and may be obtained from the Power Authority of the State of New York, 270 Broadway, Room 1300, New York 7, New York, upon application and prepayment of a fee of Ten ($10.00)) dollars per initial set and Five ($5.00) dollars per set for additional sets, no part of which will be refunded.

Bids will not be restricted to American contractors.

Bids must be made in duplicate in accordance with instructions contained in the Information for Bidders. Guarantee will be required with each bid in an amount not less than 10 percent of the gross sum bid.

The right is reserved to reject any or all bids.

W. S. CHAPIN
GENERAL MANAGER

Bids: July 26, 1956

West Side Sanitary District Onondaga County, New York

ADVERTISEMENT
NOTICE TO CONTRACTORS
CONSTRUCTION OF THE
WEST SIDE FORCE MAIN
CONTRACT NO. 5

Separate sealed bids for the construction of the West Side Force Main, Main Pumping Station of the West Side Sanitary District to Hiawatha Boulevard, West Side Sanitary District Contract No. 5, will be received for the Onondaga Public Works Commission by the County Purchasing Agent, Room 107, County Court House, Syracuse 2, New York until 2:00 P.M. (Eastern Daylight Saving Time), July 26, 1956 and there at said office publicly opened and read aloud.

The West Side Force Main includes the construction of approximately 9,350 lineal feet of 24-inch reinforced concrete pressure pipe sewage force main, including two railroad crossings, a brook crossing, and rip-rap protected embankment, together with various appurtenances.

Information for Bidders and all Contract Documents may be examined at the said office and copies of the same obtained upon payment of Ten Dollars ($10.00) for each set. Any bidder who has submitted a bonafide proposal, upon returning such set in good condition within thirty (30) days of the date of receiving bids, will be refunded the full amount of his deposit. One-half of the deposit will be refunded to all non-bidders upon return of such set within thirty (30) days of the date of receiving bids.

Copies of the Contract Documents may be examined at no expense at the above office, at the office of the Onondaga Public Works Commission, 418 South State Street, Syracuse 2, New York, and at the office of O'Brien & Gere, Consulting Engineers, 400 East Genesee Street, Syracuse 2, New York.

The right is reserved to waive any informalities in the bids and to reject any or all bids.

ONONDAGA COUNTY, NEW YORK
By: Robert W. Sollinger,
County Purchasing Agent
Dated: July 5, 1956

Bids: July 17, 1956

Contract TA-150.001

ADVERTISEMENT
THE PORT OF NEW YORK AUTHORITY
TETERBORO AIRPORT
DEMOLITION OF ST. ANTHONY'S
CHURCH

Sealed proposals for demolishing St. Anthony's Church and Rectory on Moonachie Road at Teterboro Airport and filling and grading the area will be received at the office of the Chief Engineer of The Port of New York Authority, Room 1100, 111 Eighth Avenue, New York 11, N. Y., until 2:30 P.M. on Tuesday, July 17, 1956, at which time said proposals will be opened and read in Room 1108.

Contract documents may be seen at the office of the Engineer of Design of the Authority, Room 1112, and copies will be furnished upon request. No deposit will be required but the documents shall be returned in good condition not later than forty days after the opening of proposals.

THE PORT OF NEW YORK AUTHORITY
Donald V. Lowe, Chairman
New York, July 5, 1956

U. S. Government

DEPARTMENT OF THE INTERIOR, Bureau of Reclamation. Sealed bids (Specifications No. DC-4719) will be received at Ephrata, Washington, until August 2, 1956, for furnishing labor and materials for Burbank Pumping Plants No. 2 and 3, Approach Channels BP-2 and BP-3 and Discharge Lines, Block 3, Columbia Basin Project, Washington. Location near Pasco, Washington. Principal items are 103,600 cu. yds. excavation; 1,839 lin. ft. furnishing and laying 30 and 42-inch diameter HC50 and HC75, concrete pressure pipe with type R joints; 535 cu. yds. concrete in structures; furnishing and installing steel discharge lines; furnishing and installing 6 motor-driven vertical-shaft, turbine-type pumping units; and other work. Completion time 360 days. For particulars, address Bureau of Reclamation, P. O. Box 937, Boise, Idaho; P. O. Box 368, Ephrata, Washington; or Building 53, Denver Federal Center, Denver 2, Colorado.
W. A. Dexheimer, Commissioner.

GOVT. OF DIST. OF COL., DEPT. OF HIGHWAYS, June 25, 1956. SEALED PROPOSALS will be recd. in Rm. 404, 499 Pa. Ave., N.W., Wash. 1, D. C., until 2 PM, EDT, July 25, 1956, and then publicly opened and read for REHABILITATION OF THE OPERATING MACHINERY OF THE 11th STREET BRIDGE OVER THE ANACOSTIA RIVER. Proposal forms, plans & specns. obtainable from Superv. Contr. & Bond Section, Procurement Office, D. C., Rm. 406, 499 Pa. Ave., N.W., upon deposit of certified check for $20.00 per set, payable to Collector of Taxes, D. C. (Tel. NA 8-6000, Ext. 2378).

Bids: July 26, 1956

West Side Sanitary District
Onondaga County, New York

ADVERTISEMENT
NOTICE TO CONTRACTORS
CONSTRUCTION OF THE
MAIN PUMPING STATION

Separate sealed bids for the construction of the Main Pumping Station, West Side Sanitary District, will be received for the Onondaga Public Works Commission by the County Purchasing Agent, Room 107, County Court House, Syracuse 2, New York until 2:00 P.M. (Eastern Daylight Saving Time), July 26, 1956 and there at said office publicly opened and read aloud. Bids will be received for:

Contract No. 2—General Construction
Contract No. 3—Electrical Work
Contract No. 4—Mechanical Equipment & Piping

These contracts provide for the construction of the Main Pumping Station, West Side Sanitary District, including a forty-two inch emergency relief sewer, a forty-two inch connection to the West Side Trunk Sewer, and a connection to a 24-inch force main.

Information for Bidders and all Contract Documents may be examined at said office and copies of the same there obtained upon payment of ten dollars ($10.00) for each set. Any bidder submitting a sealed bid to the Purchasing Agent, Onondaga County, upon returning such set in good condition within thirty days of the date of receiving bids, will be refunded the full amount of his deposit. One-half of the deposit will be refunded to all non-bidders upon return of the sets of plans and contract documents in good condition within thirty (30) days of the date of receiving bids.

Copies of the above described contract documents may be examined at no expense at the above office of the Purchasing Agent, at the office of the Onondaga Public Works Commission, 418 South State Street, Syracuse, New York or at the office of O'Brien & Gere, Consulting Engineers, 400 East Genesee Street, Syracuse 2, New York.

The right is reserved to waive any informalities in the bids, and to reject any or all bids.

ONONDAGA COUNTY
Robert W. Sollinger,
County Purchasing Agent

Dated: July 5, 1956

Bids: July 17, 1956

Pennsylvania Turnpike Commission
Harrisburg, Pennsylvania

NOTICE TO BIDDERS

Sealed proposals will be received by the Pennsylvania Turnpike Commission through the Chairman, 11 North Four Street, Harrisburg, Pennsylvania, until 10:00 a.m. Eastern Daylight Saving Time, the 17th day of July 1956, and immediately thereafter will be taken to the Public Utility Commission's Hearing Room #2, North Office Building, State Capitol, Harrisburg, Pennsylvania, and publicly opened and read aloud for the following contract:

Contract No. 190. To furnish and deliver all materials and to do and perform all work for the painting of ten (10) steel bridges hereinafter described and specified on the Pennsylvania Turnpike in Somerset, Bedford and Franklin Counties. These bridges are designated and situated as follows:

Bridge No. B502—Single Span Thru Plate Girder Bridge carrying LR 269 (US 219) over the Turnpike at Station 624+40.63 in Somerset County.

Bridge No. B438—Single Span Thru Plate Girder Bridge carrying LR 269 (US 219) over the Turnpike at Station 721+70.5 in Somerset County.

Bridge No. B481—Three Span Thru Plate Girder Bridge carrying LR49 (US 219) over the Turnpike at Station 858+50 in Somerset County.

Bridge No. B482—Single Span Thru Plate Girder Bridge carying LR55123 over the Turnpike at Station 996+50 in Somerset County.

Bridge No. B547—Single Span Thru Plate Girder Bridge carrying T-513 over the Turnpike at Station 1026+30 in Somerset County.

Bridge No. B497—Single Span Thru Plate Girder Bridge carrying LR55051 over the Turnpike at Station 1403+85.21 in Somerset County.

Bridge No. B508—Single Span Deck Plate Girder Bridge carrying Turnpike over LR 119 (US 30) at Station 687+88.92 in Bedford County.

Bridge No. B512—Single Span Deck Plate Girder Bridge carrying Turnpike over LR47 (US 220) at Station 848+33.17 in Bedford County.

Bridge No. B518—Single Span Thru Plate Girder Bridge carrying T-656 over Turnpike at Station 1321+91 in Bedford County.

Bridge No. B465—Single Span Thru Plate Girder Bridge carrying LR264 A over Turnpike at Station 548+09.50 in Franklin County.

Copies of plans and Contract Documents are on file and open to public inspection on June 27, 1956, at the office of the Pennsylvania Turnpike Commission in Harrisburg, Pennsylvania, and at the Everett Maintenance Building, Everett, Pennsylvania. Plans and contract documents will not be available before this date for mailing to prospective bidders.

Plans and contract documents may be obtained from the Commission upon payment of ten ($10.00) dollars for each set. No refund will be made for plans or contract documents returned unless the project is withdrawn from letting by the Pennsylvania Turnpike Commission.

Remittances are payable by check or P.O. money order to the Pennsylvania Turnpike Commission and must accompany requests for specifications and contract documents.

The character and amount of bid security to be furnished by bidder is stated in the Instructions to Bidders.

No bids may be withdrawn for thirty (30) days after the scheduled closing time for receipt of bids.

The Pennsylvania Turnpike Commission reserves the right to waive any informalities in or to reject any or all bids.

PENNSYLVANIA TURNPIKE
COMMISSION
John F. Byrne
Secretary and Treasurer
Harrisburg, Pennsylvania
25 June 1956

Bids: July 19, 1956

Pennsylvania Turnpike Commission
Harrisburg, Pennsylvania
New Jersey Turnpike Authority
New Brunswick, New Jersey

NOTICE TO BIDDERS

Sealed proposals will be received by the Pennsylvania Turnpike Commission and the New Jersey Turnpike Authority, acting in conjunction as specified in the Proposal Documents, until 10:00 a.m. Eastern Daylight Saving Time, July 19, 1956, for Contract PN7 in connection with the construction of the Delaware River Turnpike Bridge planned as a connection between the Pennsylvania and New Jersey Turnpikes. This Contract comprises the relocation of approximately 453 feet of Cherry Lane in the vicinity of Piers 15 and 16, including grading, paving and drainage.

The principal items of work include:

Roadway Excavation, Earth
6" Crushed Aggregate Base Course Type B
2" Bituminous Surface Course ID-2
24" Reinforced Cement Concrete Pipe

All of the work is located in Bucks County, Pennsylvania.

Proposals will be received at the Administration Building of the Pennsylvania Turnpike Commission, 11 North Fourth Street, Harrisburg, Pennsylvania, and immediately after the hour for closing be taken to the Public Utility Commission Hearing Room No. 1, North Office Building, Harrisburg, Pennsylvania, and immediately publicly opened and read aloud.

Proposal Documents may be examined during office hours on or after July 3, 1956, at the office of the Pennsylvania Turnpike Commission or at the office of the New Jersey Turnpike Authority, Administration Building, New Brunswick, New Jersey. Proposal Documents will be furnished upon payment of twenty dollars ($20.00) for each set. No refund will be made.

PENNSYLVANIA TURNPIKE
COMMISSION
John F. Byrne, Secretary-Treasurer
NEW JERSEY TURNPIKE
AUTHORITY
Paul L. Troast, Chairman
June 28, 1956

Bids: July 19, 1956

Town of Colonie, New York

ADVERTISEMENT
NOTICE TO CONTRACTORS
FILTER PLANT EXTENSION
COAGULATING AND SETTLING BASINS
AND
BOOSTER PUMP STATION

Sealed bids will be received by the Town Clerk, Harold R. McCabe, of the Town of Colonie, New York on the 19th day of July 1956, until 2:30 P.M. Daylight Saving Time, at the office of the Town Clerk in the Town Hall, Newtonville, New York, for furnishing labor, materials and equipment and constructing an extension to the Filter Plant, coagulating, settling basins, and a Booster Pump Station together with furnishing miscellaneous material and equipment for the project.

The Filter Plant coagulating and settling basins have been divided into the following sections, contractors may bid on any or all sections.

Section A—General Construction on Extension of Filter Plant Building, Concrete Filter Tubs, Grading, Walks, Roads, etc.

Section B—Filter Plant Equipment consisting of filter bottoms, sand, gravel, pipe gallery, piping, valves, specials, standards, instruments and miscellaneous equipment.

Section C—Coagulators, settling basins, piping and equipment. Aerator and Equipment. Improvements to present coagulator.

Section D—Plumbing Work.
Section E—Heating Work.
Section F—Electrical Work.
Section G—Outside Piping at Filter Plant.

The Booster Pump Station has been divided into four sections as follows:

Section 1—Construction of Building, installation of piping, valves and appurtenances and the furnishing and installing of appurtenances called for by plans or specifications.

Section 2—Furnishing 4,400 G.P.M. pumps, with motors and appurtenances called for by the plans or specifications.

Section 3—Furnishing pipe and fittings, called for by plans or specifications.

Section 4—Furnishing valves and appurtenances called for by plans or specifications.

The Information for Bidders, Forms of Bid, Forms of Contract, Plans, Specifications and Performance Bonds may be examined at the office of the Town Clerk, Town Hall, Newtonville, New York, and at the office of Keis & Holroyd, 257 Broadway, Troy, New York. Copies thereof may be obtained at the office of Keis & Holroyd, or from the Town Clerk, upon payment of $25.00 for each set. Any bidder upon returning such set at the time of bidding and in good condition, will be refunded his payment, and any non-bidder upon so returning such set within 30 days of the date of receiving bids, will be refunded $20.00.

The Town Board of the Town of Colonie, New York, reserves the right to waive any informalities in or to reject any or all bids.

A certified check made payable to the order of the Town of Colonie, in the amount of Five Per Centum (5%) of the bid must be deposited by each bidder with his bid as a guarantee that in case the contract is awarded to him, that he will, within five (5) days thereafter, execute such contract and furnish a satisfactory performance bond. On failure to do so, he shall forfeit the deposit as liquidated damages and acceptance of the bid will be contingent upon the fulfillment of this requirement by the bidder.

The successful bidder will be required to furnish a performance bond satisfactory to the Town of Colonie, New York, in the amount of the contract and having as surety thereon, such surety company or companies as are acceptable to the Town of Colonie, New York.

No bidder may withdraw his bid within 30 days after the date set for the opening thereof. Any bid may be with drawn prior to the above scheduled time for the opening of bids or authorized postponement thereof.

HAROLD R. McCABE, TOWN CLERK
Keis & Holroyd
Consulting Engineers
Troy, New York
Dated: June 18, 1956

EMPLOYMENT OPPORTUNITIES

The Advertisements in this section include all employment opportunities—executive, management, technical, selling, office, skilled, manual, etc.

NATIONAL COVERAGE

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Positions Wanted
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The advertising rate is $28.25 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

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Subject to Agency Commission.

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REPLIES (Box No.): Address to office nearest you c/o this publication, Classified Adv. Div.
NEW YORK: P. O. Box 12 (36)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

POSITIONS VACANT

Mechanical and Piping Erection Superintendent for sewage treatment and filtration plant construction. Midwestern contracting firm specializing in this work has permanent position open. Please give experience and full details in reply. Replies will be held confidential if requested. P-1719, Engineering News-Record.

Young graduate civil engineer with two years or more experience in building design or construction with liking and aptitude for structural design and analysis. Position with National Association in concrete products field, Chicago Headquarters. Excellent opportunity in growing organization and industry. Please furnish complete resume, including salary desired, in first letter. P-2158, Engineering News-Record.

Assistant Professor—To teach undergraduate courses in structures and applied mechanics. Salary depends on qualifications of applicant. Department of Civil Engineering, University of North Dakota, Grand Forks, N. Dak.

Engineer Estimator with foreman and superintendents experience on large and small sewer jobs. This is a small company; current gross $650,000. Personnel is competent and no junk equipment. Large but competitive market. Midwest location. Key job to man with proven ability. Salary, share of total profits, and voice in company affairs. State full experience and salary expected in first letter. P-2099, Engineering News-Record.

Instructor, Assistant or Associate Professor in electrical engineering. Master's degree, teaching experience desirable, not essential. Salary (9 Months) $4200-6800. New York State. P-2080, Engineering News-Record.

Designers & Draftsmen—Structural, electrical, piping air cond., & arch. industrial buildings and power plants. Marbarry, 120 Greenwich St., N.Y.C. RE-2-3749.

Bridge construction superintendent wanted for work in Florida. Submit experience record, qualifications, wages desired, references, etc. Must be experienced in all phases of reinforced concrete and steel bridge construction. P-2148, Engineering News-Record.

College Teaching position open to teach civil engineering and mechanics courses other than structural. Rank and salary based on applicant's qualifications. Write: Head, Civil Engineering Department, Clarkson College of Technology, Potsdam, New York.

Wanted . . . Bridge Superintendent to take complete charge of bridge and foundation work for long established New England contracting firm operating in New York and New England. Salary commensurate with experience and ability. P-1980, Engineering News-Record.

Midwest Consultant wants senior materials engineer with broad experience. $8,000-$10,000 bracket, depending on background. Reply in full to P-2076, Engineering News-Record.

College Instructor—Young engineering graduate. Some industrial experience desirable. Opportunity to work on advanced degree. Write: Head, Department of Engineering Drawing, Iowa State College, Ames, Iowa.

POSITIONS VACANT

Accountant . . . able to fill responsible position in main office of medium size construction firm. Prefer man in early 40's with experience in construction accounting. Located in central Connecticut. Send full details and salary requirements. Reply P-2176, Engineering News-Record.

Asphalt Batch Plant & Laydown Inspectors. Also, soils lab. tech.—O'seas Airbase, mild climate. Call or write Mr. Lambert, Patchen & Zimmerman, 120 Greenwich St. NYC RE2-4187.

Civil and structural engineers by consultant on buildings, bridges and highways. Excellent opportunity for several well qualified men. Box 121, Station H, Toledo, Ohio. Replies acknowledged.

R. R. Bridge Designers, permanent positions with consulting engineers in Chicago. State experience and salary desired. Do not apply if presently employed by C.&N.W., Wabash, Pennsy., I.C., B. & O., Erie, Nickel Pl., C.R.I. & P., Soo Line. All applications will be answered and kept strictly confidential. P-2207, Engineering News-Record.

Civil Engineer with executive ability. Will get experience in all phases of engineering. Age 30-40. Opportunity for capable and ambitious man. Salary open. Write: P-2060, Engineering News-Record.

Mechanical and Piping Detailer for sewage treatment and filtration plant construction. Midwestern contracting firm specializing in this work has permanent position open. Please give experience and full details in reply. Replies will be held confidential if requested. P-1715, Engineering News-Record.

Civil Engineers, Designers, Draftsmen experienced in the design of sewers, pumping stations, sewage treatment plants, water supply systems, structural and hydraulic design, hydraulic computations, specs. O'Brien & Gere 400 E. Genesee St., Syracuse, N. Y.

POSITIONS WANTED

General Superintendent—Expert Methods Man, presently with large Western Engineer Contractor, as Member of the Board and General Superintendent of Operations. Wants change for personal reasons. 41 years old. From Denver, Colorado, West. Will consider smaller company, if they are ambitious. PW-2154, Engineering News-Record.

Construction Superintendent, experienced with refineries, chemical plants, all types of heavy construction, good estimator and cost engineer, either engineering or detailed **estimates, available soon.** Age 47, speaks, **reads** and writes Spanish, Latin American experience, location unimportant, have good following. Prefer chemical plant or mill and smelter, comprehensive all crafts. PW-2142, Engineering News-Record.

Structural Steel Erection, B.S.C.E., 28, 6 years experience in field and office on bridges, buildings, and industrial maintenance. Engineering, supervision of fieldwork, estimating and pricing, management. PW-2148, Enginering News-Record.

Construction Executive 28 years experience in all phases of heavy and industrial construction, power plants, chemical plants, refinery installations, buildings, locks, dams and tunnels, interested in connection with aggressive contractor in west or northwest doing lump sum contracts and promotional sales work. Estimating and pricing accurate, and construction methods current. Primary education M.E. Desirous of participating arrangement. PW-1992, Engineering News-Record.

(Continued on opposite page)

CHIEF EXECUTIVE ENGINEER

This progressive company wants man who has come up thru the construction or heavy mfg. industry and whose experience and capabilities now qualify him for top position.

Man should qualify shortly for new position of Vice President and Chief Engineer and have earning capacity of $18,000 to $25,000 annually.

CONSTRUCTION SUPERINTENDENT

This leading company is in the market for a top notch general construction super. One who has successfully handled responsibility for all costs, etc.—construction of heavy industrial—concrete—structural steel as well as mechanical installation. $10,000 to $15,000. Steady position—no travel. Companies pay your fee.

Send resume or write for application. Established 1915.

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Gas & Diesel Engines
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A competent Administrative Executive to supervise Engineering, Design and Research Lab; and work closely with Sales and Production. Must have knowledge of product, personality & prestige. A 2nd or 3rd man with present limited opportunities will find this position a challenge. Our client is a fine, nationally known organization manufacturing under 100 H.P. medium, high-speed industrial gas, gasoline and diesel engines. Also seeking:

SALES MANAGER	**$15,000**
SALES ENGINEERS	**$6-8,000**

Client will pay all expenses, our fee.
Contact or submit resume to:

J. L. OVERHOLT **WAbash 2-5020**
Wabash Agency, 202 S. State **Chicago**

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We offer the original personal employment service (established 46 years). Procedure of highest ethical standards is individualized to your personal requirements. Identity covered; present position protected. Ask for particulars.

R. W. BIXBY, Inc.

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Provide an indexing or subject word.

Write it as the first word of your ad.

If it is a Position Wanted or Position Vacant ad, make the first word the kind of position sought or offered.

This will assure proper classification in the column.

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Proper Classification increases the possibility of Prompt Returns

POSITIONS WANTED

(Continued from opposite page)

Construction Engineer, 31 BSME 4 yrs. experience. Field Engr. and assist. supt. on industrial and institutional bldgs. Relocate to West Coast or overseas with wife (teacher & secretary.). PW-2108, Engineering News-Record.

Position Wanted, Construction superintendent age 48 twenty five years experience on bridges, roads and heavy work, clean record, graduate engineer, available thirty days, now completing large bridge project, address PW-2167, Engineering News-Record.

Chief estimator age 38 engineer fully experienced government industrial, commercial and private work. Handle complete bid, buying, management. Currently employed, seeks new connection. Will relocate minimum $10,000 plus bonus arrangement. PW-2106, Engineering News-Record.

Construction Executive, buildings and heavy construction, sound experience bid to completion, qualified to manage a project, branch office or a business, seeks new connection where top man is required. Minimum $15,000. PW-8792, Engineering News-Record.

Structural Engr. 36, BSCE, P.E., Married, 6 years structural design, 3 years watersewer design and construction. Available for responsible position in any location. PW-2210, Engineering News-Record.

Registered graduate engineer and land surveyor, 37, desires permanent responsible position with consultant. Sound technical and administrative experience in design and construction. Highways, interchanges, soils, precise engineering and land surveys, drainage and flood control, land development. Location Wisconsin, Illinois, Michigan, $10,000 and profit share. PW-2177, Engineering News-Record.

Concrete Const. Engr., 36, C. E., P. E. estimate, price, field supervision, detail, design, negotiate, sell. Fons., structures, finish work. PW-2189, Engineering News-Record.

Construction executive, 33, B.S., general manager, estimator, thoroughly experienced industrial, commercial construction. Location immaterial. PW-2181, Engineering News-Record.

Sales Engineer, Assoc. M. ASCE, Member APWA and SAME: desires position with manufacturer or distributor: construction equipment. 8 years engineering sales development, distributor sales training, direct sales. 17 years design and construction, earthwork and concrete. Write and speak Spanish. California or Mexico. PW-2186, Engineering News-Record.

Bridge Superintendent, 44, 23 years advance general superintendent or manage department for medium firm venturing highway structures in Southern states PW-2202, Engineering News-Record.

Senior Hydraulic & Irrigation Engineer—varied and extensive experience in the design of irrigation, drainage and flood control projects: Available for either foreign or U.S. assignments. PW-2213, Engineering News-Record.

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Estimating Group P.E. long experience heavy construction. Highways, tunnels, sewage, structures. Quantity takeoffs. Complete engineer's and competitive estimates. Vicinity N.Y.C. PTWW-2215, Engineering News-Record.

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Hydraulic Engineer experienced in Earth and Concrete Dam Design

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2½ year ten million Maryland job handled completely at site. Excellent opportunity to become part of a young and growing construction organization. Needed about August 1. Give full resume, education, experience and salary to:

Blount Brothers Construction Company

P. O. Box 949 Montgomery, Alabama

ARCHITECTURAL ENGINEER
WANTED

College graduate in Civil Engineering not over 30 to act as sales engineer in Lightsteel Structural Section Division of an old established and successful company. Location Pittsburgh district. Distribution nationwide.

Good chance of advancement for man with imagination and ability looking for a permanent position with a bright future.

State education, employment history and salary.

Replies confidential. Write

P-2208, Engineering News-Record
Class. Adv. Div. P.O. Box 12, N.Y. 36, N.Y.

STRUCTURAL STEEL FABRICATING CO.

at

WILMINGTON, DEL.

WANTS

PLANT SUPERINTENDENT
STRUCTURAL ENGINEERS
STRUCTURAL DETAILERS

Complete new organization required to operate large modern plant. Provides opportunity for those eager to progress rapidly in a growing company. Only want aggressive individuals who are capable of creating security through their efforts and ability.

Reply by letter to A. S. Wikstrom, Pennsylvania Bldg., Wilmington, Del., giving complete information on self.

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General Superintendent capable of organizing, scheduling, and completing large, urban expressway projects in Cook County, Illinois. Experience required in all phases of excavation, sewers, paving, and structural concrete.

P-2206, Engineering News-Record
520 N. Michigan Ave., Chicago 11, Ill.

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Edward A. Kolner

Arthur G. McKee & Company
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Salary commensurate with education and experience. Write outlining personal history and work experience.

Recruiting Supervisor, Box 137
ARABIAN AMERICAN OIL COMPANY
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Allied Chemical & Dye Corporation
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Large, internationally known engineering and construction firm has excellent opportunity for executive with proven record in business development in South America. Would work initially out of firm's Home Office ultimately opening branch office in South America.

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Must have the ability and a past record of dealing with top people in government and private industry in developing large contracts. This executive will have the opportunity to build a business in South America to whatever size and extent capable and to administer the area operation.

Write:

P-2140, Engineering News-Record
1125 W. 6 St., Los Angeles 17, Calif.

CONSTRUCTION COST ENGINEER

Engineering graduate with 3 years' industrial plant construction experience, familiar with field practices and procedures. To prepare and analyze field construction costs including field labor estimates and site surveys for cost estimating. Occasional visits to job sites.

CONSTRUCTION COST ESTIMATOR

Graduate of accounting school with 6 to 8 years' experience in construction estimating and cost accounting for industrial plants.

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This index is published as a service to the reader. Every care is taken to make it accurate but SEARCHLIGHT SECTION assumes no responsibility for errors or omissions.

Acme Burlap Bag Co................ 192
Alan Steel Co Inc................ 193
Albert Pipe Supply Co Inc........... 198
Ambursen Dam Co., Inc............. 194
American Air Compressor Corp...... 193
A-1 Iron & Metal Co............... 194

Bass Construction Co., George...... 194

Contractor's Machinery Co........... 194

Davidson Pipe Co Inc............... 198
Deatherage & Son Inc.............. 192
Diesel Motors Co.................. 194
Drachman Steel Corp., Hy.......... 193

Equipment Corp of America......... 193

Foster Co., L. B.................. 198

Globe Pipe & Fitting Co............ 198

Harriman & Co., Ltd., J. N.......... 192
Hodge & Hammond, Inc............ 193

Indyk Bros, Construction Co, Inc... 192

Midwest Steel Corp................ 198
Mississippi Valley Equipment Co... 198
Morrison-Knudsen Co., Inc.......... 194

National School of Heavy Equipment Operation 192

Northern Builders Supply............ 192

O'Neill, A. J......................... 194

Parkinson & Son R. A............... 193
Pfotzer, E. & E. J.................. 192

Service Supply Corporation.......... 193
Smith Inc., L. B.................... 193
Smith Co. Inc, R. G................. 194
Swabb Equipment Co............... 194
Swift Wm. P....................... 193

Tyler Equipment Corp.............. 192

Weiss Co B. M..................... 194
Western Foundation Corp........... 193
Williams Construction Co........... 194
Wilson Eng. Corp.................. 192

Wood & Sons Inc. Clyde W......... 194

FS 2169 198

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10" WF @ 45#
12" WF @ 27#
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12" WF @ 36#
12" WF @ 40#

12" WF @ 45#
12" WF @ 50#
14" WF @ 30#
14" WF @ 34#
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ADVERTISERS IN THIS ISSUE

Acker Drill Co.	157
Allis-Chalmers Mfg. Co. (Tractor Div.)	1
Allis-Chalmers Mfg. Co., Machy. Div	78, 79
Aluminum Co. of Amer.	41
Amer. Bridge Div., U.S. Steel Corp.	91
Amer. Pipe & Construction Co.	3rd Cover
Amer. Road Equip. Co.	173
Armco Drainage & Metal Prod., Inc.	2nd Cover
Asphalt Corp. of Amer.	88
Assoc. Steel Corp.	98
Atlantic Steel Corp.	161
Atlas Powder Co.	153
Automotive & Aircraft Div., American Chain & Cable Co.	134
Barber-Greene Co.	172
Bay City Shovels Inc.	14
Bayley Co., The Wm.	118
Bethlehem Steel Co.	139, 163
Borden Metal Prod.	22
Broderick & Bascom Rope Co.	4th Cover
Bruning Co., Inc., Charles	69
Buchanan Lumber Co.	161
Bucyrus-Erie Co.	17
Buffalo Forge Co.	122
Butler Mfg. Co.	51
Case Foundation Co.	161
Ceco Steel Prod. Corp.	100, 101
Chain Belt Co.	141
Clark Equip. Co., Const. Machy. Div.	154
Clearprint Paper Co.	135
Cleveland Trencher Co.	165
Commercial Shearing & Stamping Co.	102
Concr. Surfacing Machy. Co.	86
Deming Co., The	112
Dicalite Div., Great Lake Carbon Corp.	70
Dorr Oliver, Inc.	126
Dur-O-Wal	171
Earle Gear and Machine Co.	86
Enterprise Galvanizing Co.	137
Euclid Div., G.M.C.	6, 7
Eugene Dietzgen Co.	98
Fairbanks-Morse Co.	3
Flexible Road Joint Machine Co.	142, 143
Michael Flynn Mfg. Co.	66
Ford Motor Co., Indust. & Eng. Div. (Truck)	132, 133
Foster Co., L. B.	2
Freyssinett Co.	59
Gardner-Denver Co.	183
Garrett Corp.	168
Goodrich Co., The B. F.	5
Griffin Wellpoint Corp.	137
Gunite Const. Corp.	137
Gunite Contr. Assoc.	161
Harnischfeger Corp.	60, 61
Hartford Fire Ins. Co.	130
Hartford Accident & Ind. Co.	130
Hope's Windows Inc.	82
Ingalls Iron Wks. Co.	52
Ingersoll Rand Co.	13
Inland Steel Prod. Co.	119
International Harvester Co.	111, 113, 115, 116, 117
International Steel Co.	80
Irving Subway Grating Co.	68
Jaeger Machine Co.	152
Johnson, C. S.	159
Josam Mfg. Co.	67
Keasbey & Mattison Co.	156
Kern Instr. Co.	64
Kinnear Mfg. Co.	114
Kit Mfg. Co., Inc.	88
Klemp Metal Grating Corp.	157
Koehring Co., The	158, 159
Koppers Co., Inc.	72, 73
Kwik Mix	159
Lamson & Sessions Co., The	155
LeTourneau-Westinghouse Co.	121, 123, 125, 127, 129, 131
Levinson Steel Co.	136
Liberty Mutual Ins. Co.	108, 109
Lincoln Electric Corp.	170
Link Belt Speeder Corp.	57
Lock Joint Pipe Co.	18
Lufkin Rule Co.	166
Lukens Steel Co.	16
Luria Engr. Corp.	48
Macomber, Inc.	99
Mahon Co., R. C.	83
McKiernan-Terry Corp.	164
W. R. Meadows, Inc.	90
Merritt-Chapman & Scott Corp.	8
Miller Electric Mfg. Co.	169
Morrison Steel Prod., Inc.	44
Morse-Starrett Prod. Co.	162
Mueller Co.	181
National Gypsum Co.	36, 81
National Steel Corp., Stran Steel Div., Great Lakes Steel Co.	150, 151
Nelson Stud Welding Div., Gregory Ind., Inc.	43
Olin Film Div.	33
D. W. Onan & Sons, Inc.	160
Owens Corning Fiberglas Corp.	45
Parsons	159
Patent Scaffolding Co.	12
Portland Cement Assoc.	167
Precision Devices Inc.	164
Presstite Keystone Engr. Co.	124
Raymond Concr. Pile Co.	87
Revere Copper & Brass Inc.	34, 35
Ric-Wil Inc.	149
Russell, Burdsall & Ward Bolt & Nut Co.	71
Rust-Oleum Corp.	11
R. H. Sheppard Co. Inc.	176
Sherman Prod., Inc.	175
Sonoco Prod. Co.	144, 145
Sprague & Henwood, Inc.	31
Standard Steel Spring Div., Rockwell Spring & Axle Co.	152
Stang Corp., John W.	65
Tectum Div., People's Research & Mfg. Co.	97
Timber Structures, Inc.	173
Truscon Laboratories	55
Unit Crane & Shovel Corp.	9
U. S. Pipe & Foundry Co.	15
U. S. Steel Supply Div., U. S. Steel Corp.	89
Universal Bldrs. Supply Co.	4
Universal Form Clamp Co.	147
Universal Mfg. Co.	179
Viber Co.	146
Vickers, Inc. Div. of Sperry Rand Corp.	160
Visking Corp.	92, 93
Waukesha Motor Co.	128
Weil Pump Co.	120
Wheeling Corrugating Co.	20
Woodward & Dickerson Inc.	162
Wrought Washer Mfg. Co.	148
Yeomans Bros. Co.	50

Professional services 195-198

CLASSIFIED ADVERTISING

F. J. Eberle, Business Mgr.

Employment Opportunities	188–191
Educational	192
Proposals	184–187
Equipment (For Rent, Sales Wanted)	192–195, 198

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Editorials

Better Factories for Improved Productivity

One noteworthy aspect of the current boom in industrial building is a continuous upgrading of plant. Wider bays, higher ceilings, better lighting and ventilation, more air conditioning, greater safety measures, increased efforts to control noise, improved employee facilities, enhanced appearance of buildings—all these changes are raising the quality of today's buildings.

It is remarkable, on first glance, that these changes are taking place during a period when labor and materials costs are also rising steadily. For all these factors are exerting a constant upward pressure on the cost of new industrial plant.

Obviously, if there were nothing more to the story, the boom would soon come to a halt. Costs would reach a point at which they would cancel the investment value of new buildings. However, there are counteracting forces.

First, the upgrading trends are largely efforts to boost production and prevent early obsolescence of plant. Some changes reflect industry's new appraisal of employee comfort as a stimulant to output. Others are measures to accommodate improved production and materials-handling methods and to increase the versatility and expandibility of plant buildings.

Second, as pointed out in the special report in this issue, more economical designs, more efficient construction methods and improved equipment are giving industry more for its building dollar.

But the construction industry cannot afford to be complacent. Even if plant standards go no higher, materials and labor costs are almost certain to continue upward—especially if huge highway and school construction programs are superimposed on the current industrial and commercial building booms. This means that designers, builders and equipment manufacturers, to keep the boom rolling, will have to stretch the building dollar even more. Better, faster, cheaper, key words of this issue's special report, also define the objective for industrial buildings.

This is the time to develop and try new ideas. With an unprecedented amount of work under way, there is more opportunity than ever to pioneer. More money is available for research, testing and trial. And owners are more willing to try new techniques in prosperous times.

Consultants should encourage industry to take the same progressive attitude toward new building designs that it does toward new production equipment. The results would benefit everybody concerned.

Action Needed on Niagara Power

Destruction of two of the three sections of the principal power generating station on the New York side at Niagara Falls by a rockslide on June 7 should spur Congress into making up its mind as to what plan it will approve for developing power there with the additional water made available to this country under the 1950 treaty with Canada. Past congressional procrastination on the matter could well have been disastrous for the people and industries of the Buffalo-Niagara region had not Canada been more foresighted. Now, because the Ontario Hydro-Electric Power Commission, as soon as the treaty was approved, went ahead with construction of a new generating station, it can temporarily help out its unwillingly less provident U. S. neighbors.

The wrecked Schoellkopf power plant belonged to the Niagara Mohawk Power Corp., which controlled practically all the flow that could be used for power development before the 1950 treaty made more water available. In approving that treaty, Congress reserved to itself the right to determine what agency should develop the additional power. Since then Congress has been considering various proposals for development of the new power by both public and private agencies. Recently, the Senate passed a bill authorizing the Power Authority of the State of New York to take over the project. The House has been at work on such a bill while also considering separate legislation to permit a group of private power companies associated with Niagara Mohawk to use the added water.

What adds urgency to the need for early action by Congress is the fact that Niagara Mohawk cannot plan effectively to replace the wrecked Schoellkopf station until it knows who is to get the added water and just how it is to be used. If, for example, Congress should approve development by the private power companies, there can be no doubt that the Schoellkopf site would be abandoned in favor of using all the water in a single development down at Lewiston where the full fall of around 314 ft can be developed. A head of 217 ft is all that can be obtained at the Schoellkopf site.

Even though some public agency such as the Power Authority of New York State is authorized to use the added water, it would now appear logical for the private utilities to join with that agency in the construction of a single overall development. That is substantially what is being done by the N. Y. Power Authority and the Ontario Hydro at Barnhart Island on the St. Lawrence River. The Power Authority already has announced its willingness to enter into such an arrangement.

In any event, the great need now is for Congress to act quickly.

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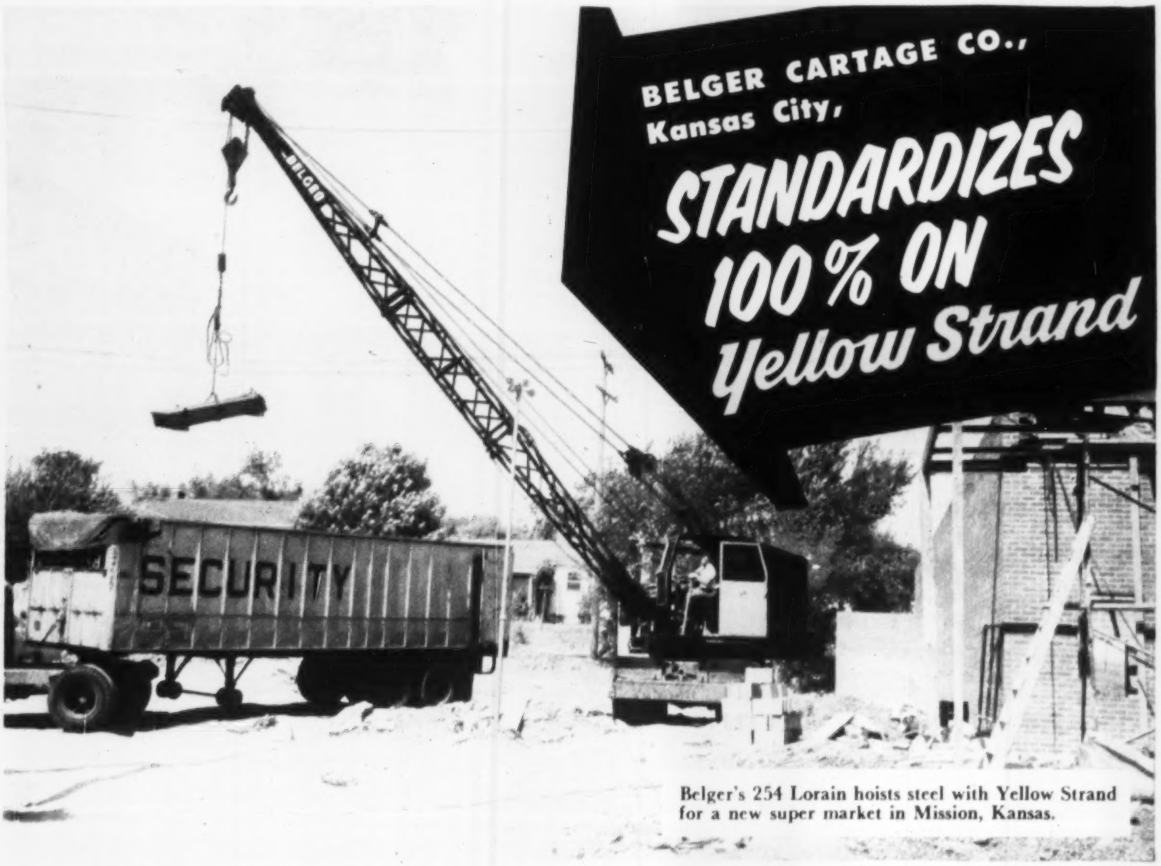

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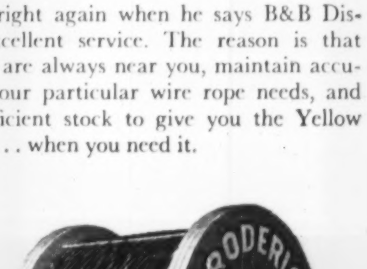

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